



Wm Remick

RT

SUCCESSFUL FARMING.

HOW TO FARM FOR
PROFIT.

THE LATEST METHODS.

BY
WM. RENNIE, SR.,
Late of the Ontario Agricultural College.

ILLUSTRATED.

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PREFACE.

The need of a practical work on agriculture has long been felt. At one time the farmer but "tickled the ground with a hoe and the land laughed with a harvest." At present average conditions are vastly different. While the science of agriculture has made rapid advance during recent years, the tiller of the soil has been slow to apply the principles thus taught. By employing methods based upon scientific principles, our farmers may largely increase their profits, in fact, they may rival the returns of the "good, old days."

"Successful Farming" is written to meet the wants of those desiring information in the latest methods of profitable farming. The aim, too, has been to show in plain language, that scientific farming is synonymous with successful farming. Mr. Rennie endeavored to give the reader the benefit of his long experience as a farmer. The book contains such ideas as can be readily carried out. The sections on the Restoring and Maintaining of Soil Fertility, the Destruction of Foul Weeds, the Conservation of Soil Moisture, Shallow Cultivation and Crop Rotation, are of special importance.

Considerable attention has been given to the garden and the orchard. Much practical advice is given in the divisions dealing with the Farm Buildings, Fencing, Ditching, and the Care of Live Stock. The author, through many years of practical farming, has

arrived at the system of agriculture which is here presented. That it has proved successful is evinced by the fact that, in competition for the cleanest and best managed farm, he was awarded the first Silver Medal presented by the Agricultural and Arts' Association, of the Province of Ontario. During the past six years, as Farm Superintendent at the Ontario Agricultural College, the author had excellent opportunities of demonstrating and practising these principles.

From visiting the Experimental Farm, and by listening to Mr. Rennie's talks at Farmers' Institutes, many of you have become more or less familiar with the methods herein laid down. Having now arrived at that time of life when the author can no longer bring before his fellow farmers the fruits of his long and varied experience, in the manner before indicated, he has, at the earnest solicitation of many, undertaken the publication of this volume. It contains the garnered knowledge of a life-time, and it is hoped it may meet with the kind approval of the farmers of this country.

WM. RENNIE'S SONS,

Publishers.

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SUCCESSFUL FARMING.

CHAPTER I.

SECTION I.

FARM MANAGEMENT.

The farm manager who thoroughly understands his business, is the most independent man in the world. The demand for competent farm managers at lucrative salaries is greater than the supply, and this demand is likely to increase. Many farms throughout the country are passing into the hands of capitalists, who prefer to have their money invested in real estate, provided they can get interest for their investment, and at the same time improve the farms so that the value may be increased.

Demand for
Farm
Managers.

Farm
Investment.

While our agricultural colleges and experiment stations are doing a good work by educating our young men, the work being done is only as a drop in the bucket.

Agricultural
Colleges.

It has been truly stated that "agriculture is the foundation on which rests all the other industries." When we understand this fact it is manifest that agriculture should have a more prominent place in the curriculum of our public and secondary schools. It certainly would be more profitable, instructive and interesting for

Agriculture
in Schools.

our young people to study practical agriculture and the teachings of science (the laws of nature) than to devote so much of their time to the dead languages and kindred dry subjects. Although many of our farmers by economy and industry, even through years of depression, have been laying by in store, a scientific knowledge in the cultivation of the soil, feeding of live stock, dairying, etc., would have materially increased their profits. At the same time, it is well to remember that although a young man may understand all the up-to-date ideas, if he lacks system and enthusiasm, as a farm manager he will fail.

**Qualifica-
tions of
Successful
Manager.**

It is the enthusiast who gets to the top and front in all professions. The successful man in any business keeps an account of all his receipts and disbursements, and at the end of each year makes out an inventory of his stock, implements, etc. By this means, he understands exactly his position. The farmer should know how much per acre it costs to grow each crop, including value of manure, cultivation, seed, harvesting, threshing, etc. Any crop in which the returns do not exceed the cost of production should be discontinued, if the cause of loss cannot be remedied.

No animal, young or old, should be kept, unless it gives a profit over the cost of food consumed and labor required. The returns, for example, can easily be obtained by the use of

the scales, when fattening cattle, or in the case of milk, the Babcock test. The knowledge necessary for a successful agriculturist is equal to and as complicated as that required for any other profession. He must understand how to restore soil fertility and maintain it by a systematic rotation of crops. He not only studies how to grow and harvest his crops, but also how to dispose of them to the best advantage. He must understand the qualifications of all the various breeds of stock, so that he may select those most profitable for the purpose intended.

Complicated
Knowledge.

It is also necessary to understand horticulture, not only for domestic purposes, but that there may be a good revenue from the orchard and the garden.

In fact, in order to obtain the best results, the farmer requires to be an encyclopedist.

Encycloped-
ist.

SECTION II.

THE LAWS OF NATURE.

Through the teaching of science and practical experiments, we can now cultivate the land intelligently, so that our farms will yield abundant crops, at much less cost than formerly. This is necessary in order that the farmers of this country may be able to compete successfully with those of certain foreign nations where native labor is worth only a few cents per day.

Teachings
of Science.

New Land. Our new lands, in their natural condition were, as a rule, very fertile, so that they produced good crops for a succession of years without any system of cultivation.

Nature's Method. Nature's method (with which the teaching of science is in accord) of supplying plant food to the soil, is by applying vegetable matter of some kind on the surface where it is decomposed and made available for plant food by the bacteria acting on it. This wise provision has only been understood during recent years.

SECTION III.

UNDERDRAINING.

Advantages The bacteria or germs can only act on dry warm soil. Therefore, in order to get the best results, it is necessary to underdrain wet lands, as these are usually too cold. It is not necessary to drain high dry land; deep subsoiling every three or four years on such land is found to give better results. Underdraining causes the surface water to percolate through the soil. At the same time sufficient moisture is retained to withstand a period of drought.

Size of Drain Tile. For underdraining, there is nothing better than the ordinary round drain tile. Judgment must be used in the selection of the size of the tile to be used. It is necessary to have the tile sufficiently large, but not larger than is required, as the cost of underdraining is governed very much by the size of the tile used. For a main

drain in ordinary cases, five or six inch tile may be used for the lower end, and four inch for the upper portion, and for the laterals (or branches) from two and a half to three inch. Drains should always be from two and a half to three and a half feet deep.

The distance apart or between the lateral drains is governed by the quantity of water to be carried off, and the quality of the subsoil through which the drains run. In a tenacious clay soil, thirty feet apart would be considered an

Distance
Apart of
Drains.



1. SUBSOIL PLOW.

average distance. In a free soil, the lateral drains may be sixty feet apart.

In commencing to drain, open up with an ordinary plow, by passing three or four times in the same track. The subsoil can then be loosened with an ordinary subsoil plow. (See Ill. 1). The earth thus loosened to a depth of about two and a half feet can easily be thrown

Construct-
ing a Drain.

out with narrow shovels. The bottom of the drain should be dug with a narrow draining spade (see Ill. 2), made for the purpose, and the loose earth thrown out with a crummer. (See Ill. 3).

Grading a
Drain.

To secure a proper grade for the bottom of a drain, use several cross-heads made from



2. DRAINING SPADE.

strips of one inch boards, three or four inches wide. The length of standards varies according to the depth of the drain. A cross-piece, about two feet long, is nailed on the top of the standard. Place the cross-heads so that the top of the cross-pieces are in line. The proper grade is ascertained by using an ordinary spirit level. When ready to lay the tile, set a



3. CRUMMER.

standard or the handle of the crummer, at the bottom of the drain, and mark in line with the top of cross-heads; this will, by testing every few feet, give a true grade for the tiles. (See Ill. 4).

When laying the tile run them so that they join well and see that they are firmly laid. In making connection, make an opening in the main drain tile with a small mill pick, and fit the lateral tight. (See Ill. 5). In covering, put the black surface soil next to the tiles. The

Laying
the Tile



4. DRAINING.

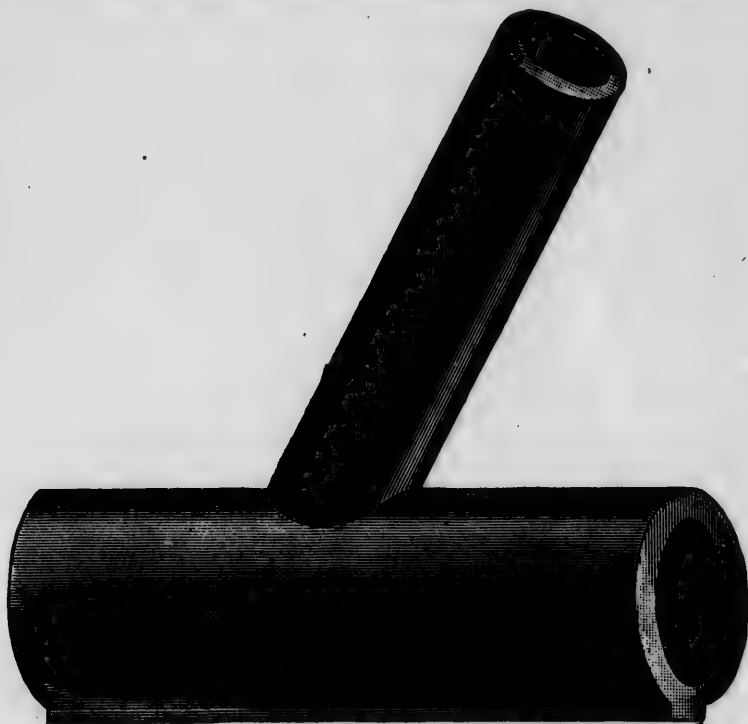
reason for this is, that the black surface soil is composed of vegetable matter and will prevent the subsoil from getting in at the joints. If the drains are properly laid, the least perceptible fall is sufficient to carry off the water without clogging.

Diagram
of Drains.

A correct diagram of all drains should be made and kept for future reference.

Ditching
Machines.

Ditching machines have not come into general use. Some years ago, the writer invented a



5. DRAIN CONNECTION.

ditching machine at great cost, which did good work, but it is not manufactured at the present time, as it was found to be too expensive (See Ill. 6).

tion,
table

SECTION IV.

CULTIVATION OF THE SOIL.

Farms that have become exhausted through continuous cropping, without a systematic rota-

Worn-out
Farms.



6. DITCHING MACHINE.

tion, can only be renewed by applying vegetable matter on the surface, and incorporating it

with the surface soil, so that it will decompose quickly, and form what is termed *humus*.

Humus.

Humus has a distinct value, apart from the plant food it contains. It absorbs and retains moisture much more readily than any other ingredient, so that a soil which is rich in humus will withstand drought, without drying out and becoming hard. Humus also aids in the decomposition of the mineral matter in the soil, changing unavailable into available plant food. It fixes ammonia in the soil, and thus prevents its being lost by leaching or evaporation. It improves the texture and mechanical condition of a heavy soil, making it lighter, more porous, and less adhesive or sticky. On a sandy soil, humus serves to bind together the loose particles of sand, and so prevents the soil from drifting and the excessive leaching of plant food.

**Humus
Retains
Moisture.**

**Humus
Fixes
Ammonia.**

**Humus
Improves
the Texture.**

**Mineral
Fertilizers.**

Mineral fertilizers, such as gypsum, lime, salt, etc., may be used to advantage on a soil which is well supplied with vegetable matter to change it into available plant food quickly; but as these are only stimulants, and do not contain any plant food in themselves, their continued use, must and does exhaust the soil of its supplies of nitrogen, potash and phosphatic compounds, so that the result is a more rapid and complete exhaustion of the soil. Without humus the soil has lost its retaining power, so that when those mineral fertilizers are dissolved, they

**Fertilizers
Only
Stimulants.**

either evaporate or leach down beyond the reach of most plants. This is why the use of land plaster does not give as good results now, as in former years.

The practical florist understands that the best soil he can use to grow plants successfully is rotted sod, and none is better than the native sod that has never been plowed. It is cut three or four inches thick, taker and piled up for a time, then turned over frequently, and exposed to heat, air and moisture, the essentials for rotting vegetable matter. After it is thoroughly rotted, and a black color, it is ready for use, and the pots may be filled and the plants set in them and watered. The plants will grow and develop perfectly with but little attention. This kind of soil will hold water like a sponge, and never get hard and crack open.

The
Practical
Florist.

Native Sod.

Rotted Sod
for Potting.

The old theoretical idea was to take soil, regardless of vegetable matter, have it analysed and find exactly what proportions of nitrogen, potash, phosphoric acid, etc., were required for plant growth. After the soil was thoroughly prepared with the necessary fertilizers incorporated in the soil, the pots were filled with plants, and watered the same as in the soil made from rotted sod. The results, however, are entirely different. The soil prepared with fertilizers, will require to be watered every day or two, otherwise it will get hard and compact, and

The Old
Theoretical
Idea.

the plants will die for lack of moisture. If it is kept thoroughly watered, the fertilizers will soon become dissolved, and leach down beyond the reach of the roots of the plant so that it will not derive any benefit from the fertilizer.

**Benefits of
Vegetable
Matter.**

From the above illustration we will understand that the fertility of a soil depends largely on the amount and quality of vegetable matter it contains. When we speak of worn out land, we do not mean the quality of the subsoil, as that undergoes little or no change. The whole difficulty is the lack of vegetable matter on the surface. When this is destroyed through continuous cropping without a proper system of rotation, the soil will get hard and crack open, unless there is rain every few days during the summer months, a thing which rarely occurs.

**Color of
Humus.**

Soil that lacks decomposed vegetable matter (*humus*) is of a light color, while a rich soil, filled with *humus*, is black.

**Bare
Summer-
fallow.**

In adopting a system of rotation of crops, a bare summerfallow should not be included, because plowing, cultivating and harrowing the land several times during the summer season adds nothing to its fertility, and is particularly destructive upon the *humus*. It temporarily

**Bare
Summer-
fallow
Destroys
Humus.**

**Temporarily
Improves.**

puts the soil in better condition by improving the tilth, thus making the plant food already in the soil soluble, so that a crop of fall wheat will grow luxuriantly, but before the land is used for another crop a large portion of the

plant food is lost by leaching and evaporation. Besides, there is an additional loss of a season's crop, and much of the labor required in cultivating the land.

Bare
Summer-
fallow
a Loss.

There are different methods of renewing worn out lands. One method is to sow peas and buckwheat early in the spring at the rate per

How to
Renew
Worn-out
Land.



7. GRAIN DRILL

acre of one and a half bushels of some long straw variety of peas, and one-half bushel of common buckwheat. The best plan is to sow with a grain drill separately (see Ill. 7), the peas in one direction, and the buckwheat across. When both the peas and buckwheat are begin-

Plowing
Under Peas
and Buck-
wheat.

ning to bloom spread farm manure over the crop at the rate of about ten team loads per acre, and plow the whole, crop and manure, under about four inches deep. Use a revolving coulter that will not clog, and a chain from the beam of the plow to the end of the evener to draw all the green crop and manure under the furrow. (See Ill. 8).

Summer
Cultivation.

After this, the plowed land must be rolled with a heavy land roller (see Ill. 9), and



8. PLOW WITH REVOLVING COULTER.

harrowed thoroughly. After the ground has been thoroughly harrowed resow with peas and buckwheat, or better, sow vetches instead of peas, and oats in place of buckwheat. Either of these will make a large quantity of vegetable matter ready to plow under by the middle of August. After plowing roll the land and harrow it immediately. This is necessary to retain the moisture which is one of the essentials for decomposing vegetable matter quickly.

By the end of August the green crop which was plowed under, as above stated, will be rotted sufficiently, so that it can be cultivated with a spring tooth cultivator (see Ill. 10), and harrowed alternately, lengthwise and across the field, two or three times. This will decompose and make available sufficient plant food, and place it on the surface where it is required. It

How to
Make
Manna.

Increasing
Fertility.



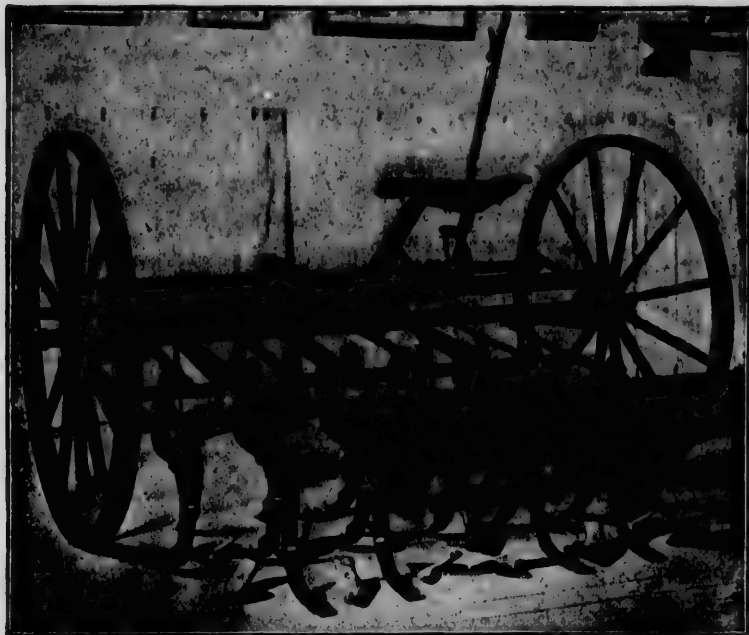
9. LAND ROLLER.

will also retain the moisture. This preparation is sufficient for a crop of wheat or any other grain. If the subsoil is a strong and tenacious clay, it will require to be loosened with a subsoil plow (see Ill. 1), or with a cultivator supplied with chisel pointed teeth, to which four-horses may be attached. (See Ill. 11). The spring tooth cultivator has also subsoil teeth.

(See Ill. 10 $\frac{1}{2}$). If the subsoil is composed of sand or gravel it would be detrimental to loosen it.

How to
Clean the
Land.

In order to clean the land of weeds it is not necessary to make a bare summerfallow. Prepare the land as for a crop and sow peas and oats, or,



10. SPRING TOOTH CULTIVATOR.

say vetches and buckwheat, early in May. When these come into bloom spread farm manure on the crop and plow under as before described, following with roller and harrows. If the land is foul with weeds and weed seeds they will soon germinate and grow under this

kind of treatment. To destroy and exterminate them is now a much easier work than it was before we had little or no knowledge of their nature, or methods of feeding and growing.

About twenty years ago the late William Burgess, a well-known gardener, in an article upon this subject stated "that no man could transplant Canada thistles better than the

The Plow
Transplants
Weeds.



104. SPRING TOOTH FOR CULTIVATING HARD LAND AND SUBSOILING.

farmer with his plow." We can understand the force of this statement when it is known that all the buds or eyes on a thistle root are near the surface of the ground (the same holds good with all perennials). The roots that run down deep into the subsoil are only feeders, and have no buds or eyes to start a new plant. By

Plowing
Down
Weed Seeds.

plowing, say seven or eight inches deep, nearly all the buds are in the furrows, and will sprout and grow quickly, several plants from each root, so that in many cases plowing multiplies the plants instead of reducing them. Plowing down weed seeds of any kind is ruinous to the land. Many varieties of weed seeds will retain their vitality in the soil for fifteen, and some as long as twenty years if excluded from the air.

The correct method to adopt for increasing



11. FOUR-HORSE SUBSOILER.

Advantages
in Shallow
Cultivation.

soil fertility, and ridding or cleaning the land of weeds, both annual and perennial varieties, is shallow cultivation. The only exception is the loosening of a clay subsoil occasionally, when a green crop and farm manure has been plowed under, and the ground rolled and harrowed about the beginning of July as before described.

Germinat-
ing Weeds.

All seeds near the surface will germinate and grow quickly, and the roots of perennials

such as Canada thistles, couch grass, etc., will quickly send up shoots. The simplest method of exterminating these is when the thistles or weeds are about three inches high, or say before any of the leaves are fully developed. When the plants are growing they derive their nourishment from and through the roots, but after the leaves are fully developed they collect a certain amount of nutriment from the atmosphere. They should be cut off from the root at this stage in their growth. This work is done expeditiously with a spring tooth cultivator, with wide points regulated to cut about two inches below the surface. (See Ill. 10).

How Weeds
Grow.

After the land has been thus cultivated, and given one stroke with the harrows, a hot July sun will destroy them. If this operation is repeated at intervals of about two weeks until September, the land will be cleaned of all perennial weeds, and all the foul seeds that are on, or near the surface. After the land has been cleaned in this manner, it should be in good condition to grow a grain crop of any kind. It should then be seeded with common red clover at the rate of twelve pounds per acre, to increase the fertility of the soil. If the clover seed is sown on the fall wheat, it should be sown early in the spring following by hand or with a grass seeder. (See Ill. 12). If it is decided to sow grain in the spring instead of

Killing
Weeds.

Increasing
Fertility.

Ribbing
in Fall.

fall wheat, this land should be ribbed in October (instead of plowing) with a double mould-board or drill plow. (See Ill. 13). An ordinary plow may be used instead, in a manner known as "Cut and Cover." This prevents the soluble plant food from leaching away during the winter, with rains and melting snows, which on the prepared ground will run off in the furrows, without interfering with the humus which is in the centre of the ribs.

Advantage
of Ribbing.



12. GRASS SEED SOWER.

Make the ribs about twenty inches wide. When land is ribbed in the fall, it allows the frost to break up the subsoil and loosen it.

Spring
Cultivation.

In the spring, these ribs are harrowed, and cultivated down with a spring tooth cultivator, and again harrowed before the grain drill is used. (See Ill. 14). Sow the grain, wheat, oats, or barley, as early as possible in the spring. There is quite an advantage in having the land

Do
eve
inc
spr
wh
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and
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roll
pulv

ribbed-in the fall, as it can be worked much earlier in the spring. Use only sound and well matured grain for seed. The following quantities are quite sufficient per acre: Barley, one and a half bushels; wheat and oats, one and a quarter bushels. In sowing clover seed with grain, the best method is to sow it in front of the grain spouts, so that it will be scattered on the surface. After sowing, give a stroke with the harrows crossways, to smooth the surface.

Quantity of
Seed
per Acre.



13. DRILL PLOW WITH POTATO DIGGER ATTACHMENT.

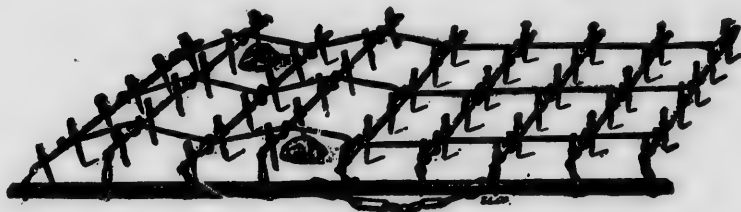
Do not roll until the land is thoroughly dry, even if by that time the grain is two or three inches high. When land is rolled early in the spring, when damp, a crust is liable to form which will encourage capillary action, so that the moisture in the soil will rise to the surface and evaporate. This is prevented by not rolling until the surface is dry. When dry ground is rolled, the lumps of earth on the surface are pulverized, and this fine mould forms a mulch-

When to
Roll.

ing which prevents evaporation. If the above directions are followed, there will be no failure in securing a catch of clover seed.

To Further
Increase
the Humus.

To further increase the humus in the soil, cut the clover early the following year for hay, say by the middle of June. When the second growth is coming into bloom, spread on the surface about ten team loads of farm manure per acre, and plow all under about four inches deep, using a roller coulter and chain as before described, after plowing under a green



14. ADJUSTABLE HARROW.

Summer
Cultivation.

crop, roll and harrow thoroughly. In about two weeks, the sod will be sufficiently rotted to cultivate with a spring tooth cultivator (one with wide points is preferable). By using a spring tooth cultivator several times and harrowing alternately during the summer and early fall, the land will be in good condition to grow abundant crops continuously, provided a systematic rotation of crops is followed, such as is described further on in this book.

SECTION V.

FENCING.

In considering the best system of farming, fencing is a very important matter. The outside or boundary fence requires to be a substantial and permanent structure, so that it will turn any animal and at the same time not be unnecessarily expensive. Sectional or cross fences should be dispensed with as far as possible, as the cost of erecting and maintaining these, amounts to considerable, besides they are a harbor for weeds. It is not necessary even on a stock farm to have more sectional fences than are shown in the accompanying diagram (see Ill. next page), of a farm laid out for a four years rotation of crops. This is the longest course advisable in order to maintain the fertility of the soil. In a three years' rotation, fewer sectional fences are required, and when few animals are kept during the summer, all the inside or cross fences may be dispensed with, except those around the orchard, lawn or private grounds, and that around a small field of permanent grass near the barn used for pasture or for cutting for green feed. (See Ill. next page).

Fences
Harbor
Weeds.

Longest
Rotation.

There are many styles of portable wire fences offered for sale at the present time, several of which are cheap and efficient. With a portable fence requisite to reach across a farm,

Hurdle
Fences.

HOW TO RESTORE & MAINTAIN SOIL FERTILITY SYSTEMATIC ROTATION OF CROPS A FOUR YEARS COURSE 180 ACRE FARM.

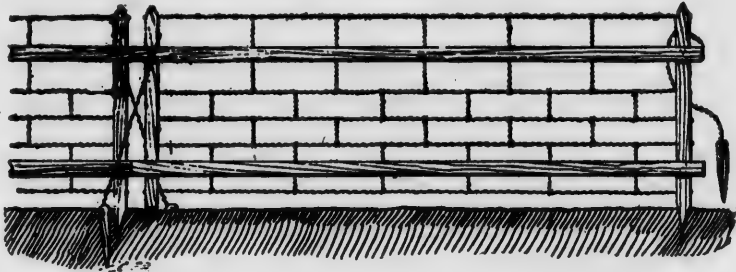


[32]

22. DIAGRAM OF FARM.

it would seldom be necessary to have more permanent inside fences than is required for a lane in centre of the farm. A convenient and durable portable fence is made and used on the Experimental Farm at the Ontario Agricultural College. (See Ill. 15). This fence is built in sections, twelve feet long and nearly four feet high. Each section contains about twenty feet of lumber, and four pounds of wire, and consists of two head pieces one and a half by

Necessary
Fences.



15. PORTABLE FENCE.

three inches and twelve feet long. The wire used throughout, including the cross sections and braces, is common number twelve twisted fence wire.

The side pieces are nailed to the head pieces, and project beyond them four inches to form the connection. The two bottom pieces are eight inches from the lower end of the heads. The upper pieces are twelve inches from the top of the heads, and on opposite sides. These form the frame-work of each

Construction of
Hurdle
Fences.

section. The wires are then stretched, being secured by passing the wire through a three-eighth inch hole in the heads, and driving a wooden peg in beside the wire. This holds everything secure, while the ends are turned down and fastened with a staple. The first wire is four inches from the bottom end of the heads, the second is twelve inches above the first, the third is six inches above the second, the fourth seven inches above the third, and the fifth or top wire is eight inches above the upper wooden bar of the frame. The top wire is barbed. The cross sections are then put on the ends, being twisted around the wires with a hook made for the purpose. The side pieces of the frame are then nailed together in the centre to hold them tightly.

**Setting the
Hurdles.**

The hurdles are held in place by wire braces, and pegs driven into the ground, as illustrated in the cut. These wire braces are four feet eight inches long, and are fastened to the upper end of each head by a staple on the inside edge of the head. The pegs are made of iron and are sixteen inches long, and a quarter by one and a quarter inches wide. The wire is secured to them by drilling a quarter inch hole through near the top of the peg, passing the wire through and twisting it round a short piece of wire, thus forming a cross which holds it secure. On one end of each hurdle is an extension of seven inches and sharpened. This enters the

hole made in the ground with a crow bar, and holds the bottom of the fence secure, while the top is held by the braces, which cross each other on the opposite side of the heads, making the connection secure and anchoring the fence firmly. In order to combine and hold the hurdles still more securely, a wire may be drawn tightly, the whole length of the fence and secured in each section with a staple. The hurdles cost about eighty cents per rod, viz., lumber thirty-five cents, wire and pegs twenty cents, and labor twenty-five cents.

Cost of
Hurdles.

A good portable fence which is being introduced in some sections of the country with entire satisfaction is constructed by using one of the many styles of woven wire fencing, that are manufactured and sent out in rolls, each roll being from two hundred to three hundred feet in length.

Portable
Woven
Fence.

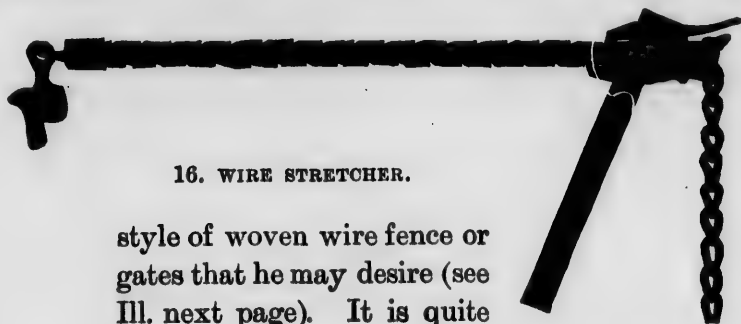
The posts to be used should be four inches in diameter and seven feet long, sharpened at one end. Hard wood is preferable. Take them, with the wire, to the field in a cart or waggon, and, with a round iron bar sharpened at one end, make a hole in the ground eighteen or twenty inches deep, in line with the stakes set for the fence. Then take a post, and inserting the sharpened point, drive it down about two feet with a maul or sledge while standing on the waggon. Then drive the waggon to where the next post is required, say thirty feet on, and

Portable
Woven
Fence Con-
struction.

repeat the same operation. A few minutes time is all that is required to set each post. When the posts are all set unroll the woven wire. Fasten it secure with staples to the end post, and tighten with a stretcher used for the purpose (see Ill. 16), and fasten the woven wire to each post with staples. This completes the fence.

Duplex
Machine for
Making
Wire Fence.

The Duplex is a new and efficient machine, whereby a farmer can construct for himself any



16. WIRE STRETCHER.

style of woven wire fence or gates that he may desire (see Ill. next page). It is quite simple and is easy to operate.

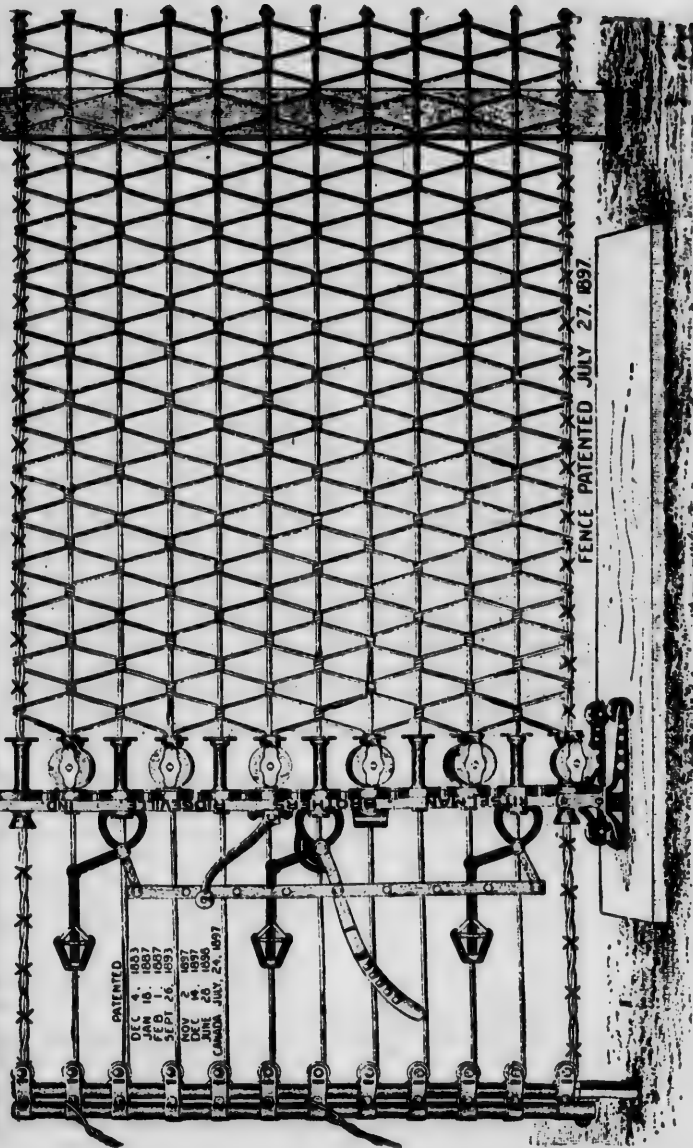
Coiled Wire.

The horizontal wires, either plain, coiled (crimped), twisted or barbed can be used in this machine. Twisted and crimped wire will contract and expand with the cold and heat, without breaking or becoming slack. (See Ill. 18). This machine will weave any height of fence up to fifty-nine inches.

Iron Stays.

After the posts are set two men can make from forty to fifty rods of fence per day, which can either be fastened to the posts for a permanent fence or rolled in bundles for portable fences. Iron stays can be woven in every seven

DUPLEX AUTOMATIC BALL BEARING WOVEN WIRE FENCE MACHINE



PATENTED
 DEC 4 1893
 JAN 16 1897
 FEB 1 1897
 SEPT 26 1893
 MAY 14 1897
 DEC 14 1897
 JUNE 26 1896
 CANADA JULY 24 1897

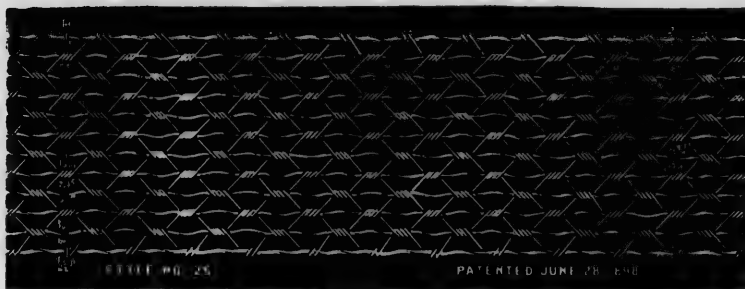
FENCE PATENTED JULY 27, 1897

or eight feet as desired, so that fewer posts will be required. (See Ill. 19). In addition to making fences intended to turn all kinds of stock, several styles of ornamental lawn fences can be made with this same machine. (See Ill. 20).

Ornamental Fence.

Cost of Portable Fence.

The cost of the woven wire is from fifty to seventy-five cents per rod, according to the style used. The cost of posts about ten cents each, or say five cents per rod additional.



18. COILED SPRING WIRE FENCE.

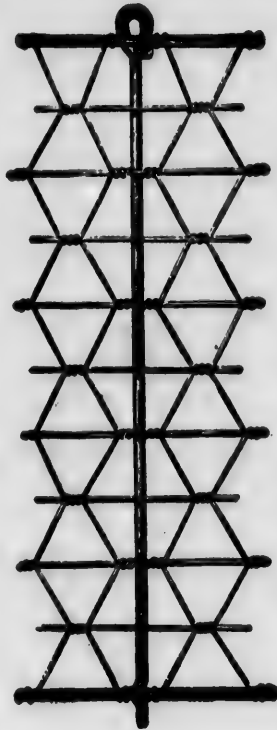
Removing Portable Fence.

In removing a portable fence all that is required is to draw out the staples and roll up the wire. Commence to roll on a barrel, which is more expeditious, and the work is not so liable to break the wire. After the wire has been rolled up take out the posts, and place all under cover for shelter. By doing this the posts will dry hard, and be more durable, and may be made to last for many years.

Permanent Fencing.

During the past five years four and a half miles of boundary fence has been erected around

the Experimental Farm at the Ontario Agricultural College, of the following design. (See Ill. 21). This is a desirable farm fence, being cheap, durable, safe and effective. A fence which will turn sheep or hogs as well as cattle.



19. WIRE STAY.

Round posts six inches in diameter are set in the ground twenty feet apart. Owing to the rolling nature of the farm this is the proper distance. On level land they might be set much farther apart, which would materially reduce the cost of the fence. Seven strands of twisted No. 12 wire are stretched on the posts, six plain and one barbed wire for the top being used, spaced as follows; starting at the bottom: six, six, six, eight, eight, nine inches. Cross sections or stay wires, cut to the proper length, are then put

Permanent
Fence at
Ontario
Agricultural
College.

on very securely with a hook made for the purpose. One man can stay about fifteen rods per day. These stay wires stiffen the fence, and prevent the horizontal wires from spreading apart, so that it will turn sheep or hogs as well

Cost of
College
Fence.

as cattle. The cost of the fence is as follows: Posts, nine cents per rod (when set twenty feet apart). Horizontal wires, twenty-two cents; cross sections, seven cents, and labor (including holes, setting posts, putting on cross sections,



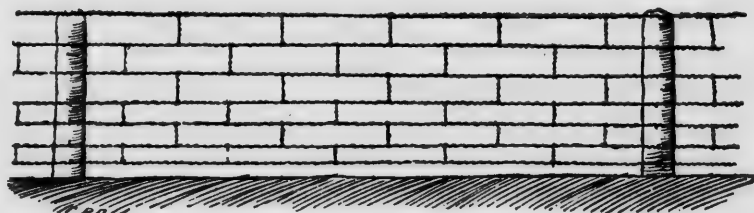
20. ORNAMENTAL WIRE FENCE.

etc.), eighteen cents per rod. Total, fifty-six cents per rod.

How to
Set Posts.

To prevent fence posts from decaying, dip the end that is to be put into the ground in lime wash. After the posts are set grade the fence bottom, so that no water will remain near

the posts. This will prevent them being raised out of the ground through ice forming. It is objectionable to bank up the ground too high around the posts, as this will cause the wood to decay rapidly with what is known as dry rot, which is caused by a germ acting on the wood. This germ would be destroyed if there was sufficient moisture in the soil.



21. COLLEGE WIRE FENCE.

SECTION VI.

ROTATION OF CROPS.

To secure the best results from our farms certain principles must be adhered to in order that the fertility of the soil be not only retained but increased, and that at the least possible cost. In order to do this one of the first steps to be taken is to adopt a system of rotation of crops which will be best suited to the circumstances. One must consider the location, the kind of soil, and the number and kind of animals to be provided for. In adopting a rotation it is essential that a crop of clover sod be plowed under every three or four years, in addition to

Rotation
Suited to
Circum-
stances.

**Clover and
Farm
Manure.**

the farm manure, in order to restore the required amount of vegetable matter for the growth of cereal and other crops. It is not only necessary to fill the soil with animal and vegetable matter, but these must be made available for plant food before the crops can derive any benefit from them.

**Mixed
Farming.**

The following rotation is recommended for mixed farming, and was followed by the writer for a number of years upon his own farm, and during the past six years, as farm superintendent at the Ontario Agricultural College, with such marked success, viz.: A four years course. (See Ill. page 32). The farm proper is divided into four sections, instead of small fields (as is customary), and cropped as follows: First

**Four Years'
Course.**

and second years, Nos. one and two sections, grass, including hay and pasture. Third year, No. three section, hoe crops, viz., corn for silage, rape, turnips, potatoes, mangel-wurzel, etc., the balance of the section in peas. Fourth year, No. four section, grain, or cereal crops, say wheat, barley and oats, all of which are seeded down with the following mixture: Red clover seed, seven pounds; Alsike clover seed, three pounds, and timothy, four pounds.

**Grass Seed
Mixture.****Variations
in Rotation.****Plowing
Sod.**

In this four years rotation certain variations can be made. If more grain is required, and less meadow and pasture, a portion of number two section may be plowed shallow after first year's grass, early in August, rolled and harrowed

immediately. The harrowing should be done thoroughly, as it is by having a fine tilth on the surface that moisture is conserved in dry weather, and this is one of the essentials in rotting sod quickly.

It is surprising how few people understand the mode of harrowing properly. When harrowing twice in a place they invariably return in the same track, instead of half lapping, so that all the land may be harrowed equally, which is desirable. The three essentials to decompose vegetable matter quickly and form humus are *heat, air and moisture*. This is according to the teaching of science, and to put this into practice, we get the necessary heat by plowing about the end of July or beginning of August. To let in the air, plow shallow, say four inches deep, and the moisture is conserved in the sod by first compacting it with a heavy roller, so that the moisture will rise from below through capillary action, then the harrowing prevents evaporation taking place. By this treatment, the sod will rot quickly, so that by cultivating, using the wide points, and harrowing alternately until the fall, the land will be cleaned from weeds, and a large amount of plant food made available for fall wheat or spring grain. The following year, the whole of number two section, including the sod left from the previous year, and the stubble land, may be plowed with a two furrow gang

Harrowing
Overlapping

Heat, Air
and
Moisture.

Plowing
Shallow.

Cultivate
and Harrow
Alternately.



23. TWO FURROW GANG PLOW.

plow (see Ill. 23) by adding a third horse for the sod. If the land is too dry and hard, use a single plow with wheel to regulate the depth. (See Ill. 8). By keeping the humus on the surface, there will be no difficulty after a few years in plowing the sod in the summer, as humus will not get hard. To hasten decomposition as described above, immediately after plowing, have the ground rolled and harrowed at once.

Plowing in
Summer.

Early fall is the best time to clean the land of weeds and weed seeds for the following season's hoe crop, and with proper implements, while there is no crop on the ground, the work of fall cultivation can be done thoroughly. What is required is to keep the broad share cultivator and harrows going alternately at short intervals until October, when the land should be in fine tilth and free from weeds, and weed seeds that may have been near the surface.

Fall
Cultivation.

All the farm manure that is on hand should be spread on the surface at the rate of about fifteen two horse waggon loads per acre, and covered with a drill plow (see Ill. 13) making the ribs about twenty inches wide. This puts the farm manure into the centre of the rib which prevents it from leaching and being lost. The decomposed vegetable matter acts as an absorbent, and prevents the liquid manure and ammonia from escaping. The furrows tend to

Cleaning
the Land.

Applying
Manure.

Drilling in
Manure.

Vegetable
Matter an
Absorbent.

drain the land, and allow the frost to act on the subsoil. The drills referred to can also be made with an ordinary plow but not so perfectly.

**Winter
Manuring.**

Provided there is only sufficient manure on hand for a portion of this section, it is advisable to leave the balance on the level without being ribbed, so that it can be manured on the surface during the winter months. If the land were ribbed, the manure would fall into the furrows, and be washed away. In spreading manure, about double the quantity should be put on the knolls or small hills, as a certain portion will leach to the lower land. On high rolling land, it is advisable in order to prevent waste, to manure and rib in the fall, so that all the liquid from the manure will be absorbed in the rotted sod, contained in the ribs. This completes the fall work on section number two which is to be followed with the hoe crop contained in section number three. (See Ill. page 32). After making due allowance for the hoe crops, including corn, rape, turnips, potatoes, mangel wurzels, etc., in this section, the balance is sown with peas, the highest portion of the section preferred, as it is usually followed with fall wheat. Supposing this sod land was thoroughly cultivated the previous autumn and manured during the winter with coarse stable manure (we prefer it coarse for peas) before sowing the peas the beginning of May, plow the coarse manure under with the two furrow plow,

**Manure on
the Surface.**

**Manuring
Rolling
Land.**

**Manuring
for Peas.**

about four inches deep. This keeps the soil dry and warm which is a very desirable condition for peas.

The portion of the land intended for mangel wurzels, sugar beets and carrots, should be prepared according to the above directions so that the soil will be in good condition for early cultivation in the spring, which is desirable in growing these roots successfully. It is important that the seeds be sown early in the spring, say end of April or first of May.

Preparation
for Mangel
Wurzels,
Beets and
Carrots.

Farm manure should be applied previous to the hoe crop, as it produces a rank growth which is desirable for fodder corn and roots, but not so in the case of grain crop. The second year after manuring is preferable for a good crop of grain.

Manure the
Hoe Crop.

After plowing, harrow the land thoroughly and get a fine tilth. When this is completed, sow the grain, which is best done with the ordinary grain drill (see Ill. 7), as it plants the grain a uniform depth which is necessary in sowing all kinds of seeds. It is desirable that the plants make an equal start, otherwise it becomes a question of the survival of the fittest, the rank luxuriant plants choking out the others. As to the depth to plant peas, in fact all seeds, a good rule to follow is *plant four or five times the depth of the diameter of the seed*.

Drilling
Peas.

Depth to
Plant Grain
and Seeds.

The quantity sown per acre is from two to three and a half bushels, according to the size

Quantity of
Seed for an
Acre.

of the grain. As peas do not stool from the root like other grain, they require to be sown thicker.

**Harvesting
Peas.**

The time to harvest peas is before they are quite ripe, as the straw of peas is of exceptional value, rated next to clover hay, which is the highest in nutritive value among fodder crops. The most satisfactory implement for harvesting peas is the Tolton pea harvester with bunching attachment. It can be attached to any mowing machine. (See Ill. 25). It is advisable to draw the peas into the barn soon after, say in one or two days after being cut. A shower of rain will very materially injure the feeding value of the straw, and long exposure to the sun will injure the straw by making it brittle and unfit for fodder.

**Threshing
Peas.**

Peas can be successfully threshed with the ordinary threshing machine by placing pulleys on each end of the cylinder shaft, double the circumference of what is ordinarily used. This will run the cylinder at half speed, while the other machinery is run at full speed. Take all the spikes out of the concave except four.

**Destroy the
Pea Bug.**

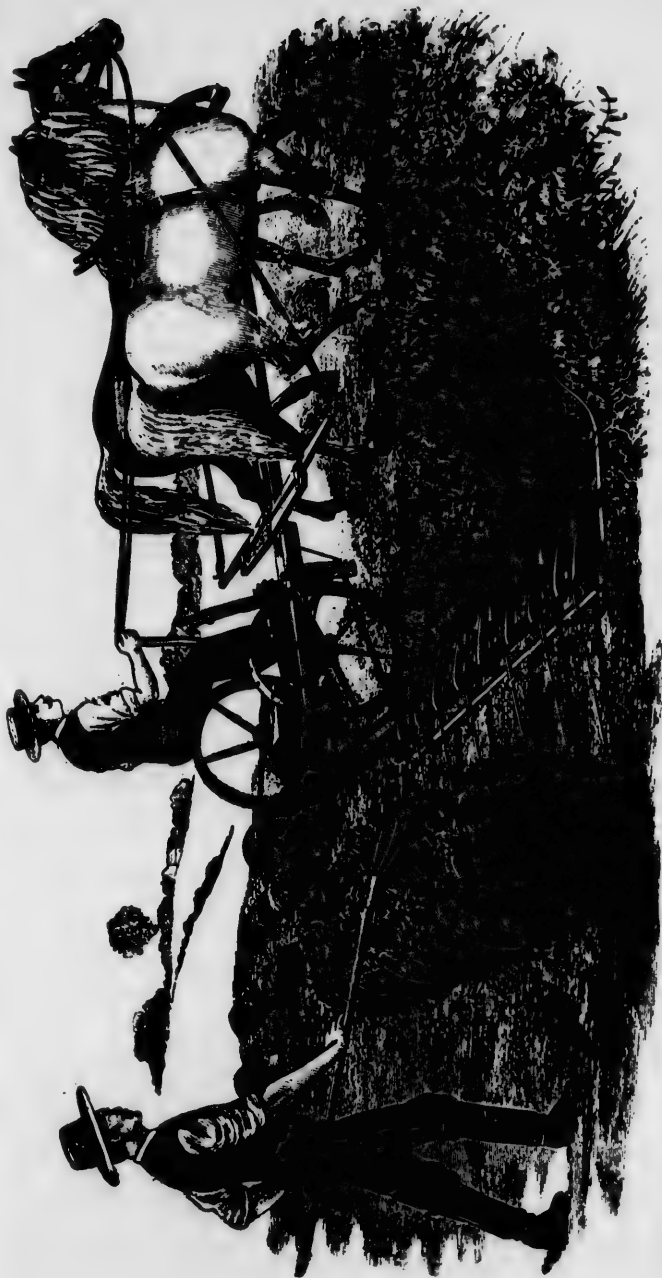
In view of the prevalence of the pea bug many farmers have given up trying to grow this valuable crop. In sections of the country where the pea bug prevails, the seed should be treated with carbon bisulphide, so as to destroy the bugs. This should be done early in the fall, while the insects are in the embryo (germ) state, and before

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25 TOLTON PEA HARVESTER.

they have materially injured the pea. The method of treatment is to use an air-tight box that will hold say ten or twenty bushels. Fill it with peas and set a dish on top of the peas containing one pound of carbon bisulphide, which is sufficient to treat fifteen bushels. Close the lid, making it as near air-tight as possible, and leave for three days. By this time the carbon will have evaporated and penetrated all the peas in the box and destroyed every germ of insect life without injury to the peas. If all the farmers in a neighborhood would unite and treat their seed peas, it would not be necessary to repeat this every year.

**Cultivation
After Pea
Crop.**

As soon as the peas are taken off the land, it should be plowed about four inches deep with the two-furrow plow. This will turn the coarse manure on top that was plowed under before sowing the peas. After plowing, roll and harrow immediately, then cultivate and harrow alternately until it is time to sow the fall wheat; the rotted sod, good farm manure and pea stubble supply the nitrogen and other elements necessary for the healthy growth of a crop of fall wheat.

**Before
Sowing Fall
Wheat.**

Before sowing fall wheat the land should be subsoiled as deep as possible with four horses (unless the subsoil is sand, or of a porous nature). Harrow and roll the ground before the grain is drilled. If there has been a heavy rain it will not be necessary to roll.

For Central and Northern Ontario the time to sow fall wheat is the last of August or first of September, and in southern Ontario from the tenth to the fifteenth of September.

Time to
Sow Fall
Wheat.

Sow fall wheat with a grain drill, at the rate of one and a quarter bushels per acre, using only good, clean and thoroughly matured seed. Should there be any indication of smut the wheat should be treated with blue stone.

Quantity of
Fall Wheat
for an Acre

The most effectual method is to make a solution in the proper proportion of one pound blue stone to one gallon of water. This is sufficient for two bushels of wheat. Having prepared the necessary amount of solution, put the wheat in a coarse sack and immerse it in the solution for five minutes, then let it drip for a few minutes, after which spread the wheat on the floor, and dust it over with slaked lime to dry it so that it can be sown with the grain drill. Do not put it in a bag before sowing, as it will heat and lose its vitality. Every germ of smut must be destroyed, otherwise it will develop and produce smut the following year.

Preparing
Seed
Wheat.

Botanists inform us that the spores cling to the kernal, and when it germinates the spores feed on the plant, finishing with the grain, so that the kernals become smut instead of wheat. The same principle holds good with oats and barley.

How Smut
Spores
Feed.

While it is important to have the soil and other conditions as favorable as possible, the best

Sow a
Productive
Grain.

results cannot be obtained unless a variety of grain is sown that will give the largest yield per acre, and of the best quality. It makes all the difference between profit and loss that a productive variety is sown.

**Varieties of
Fall
Wheat.**

Fall wheat, like other varieties of grain, has its day. Every farmer who has had experience in the growing of fall wheat will remember varieties which excelled all others for a few years, then had to give place to something new on account of hybridizing (frequently self hybridized). No doubt grain would not depreciate so rapidly if only the best grains were sown each year. Among the leading varieties at present are Dawson's Golden C and Early Genesee Giant, the first a sport, and the latter obtained by artificial crossing. In order to procure the best results we must not only have the land in good condition, but we must also sow the variety that will give the largest yield.

**Harvesting
Fall
Wheat.**

Fall wheat should be cut when the grain is in the firm, dough state, according to analysis, this gives the best quality of flour. With the improved harvesting machinery of the present time there is no excuse for allowing the grain to get over ripe. The only harvester, or harvesting implement, of sixty years ago was the sickle. After this came the scythe with the bow, then the grain cradle. This was followed by a very crude style of reaping machine. Several inventions followed, all of which a man had to put

**Harvester
of 1840**

**Improve-
ments in
Harvesting.**

the grain off the platform with a fork or rake. The next advance or improvement was the self raker, followed by the Marsh harvester, on which two men rode and bound the grain as it was elevated. To-day we have the six-foot self binder complete (see Ill. 28), a machine that will cut and bind the heaviest crop of grain, and do the work in the most perfect manner.

**Modern
Harvester.**

In setting up sheaves to dry the 'long shock or stook is preferable. (See Ill. 29). When the sheaves are set up firmly in pairs, ten or twelve in a shock, it should stand with ends north and south, so that both sides will be equally exposed to the sun. There is little gained by placing on the shocks what is known as cap sheaves, except on a round shock, for if the centre of the latter gets wet with rain it is difficult to dry out. Wheat should stand a week in the field after being cut so that it may dry out thoroughly and the grain become hard.

**Shocking
in the Field.**

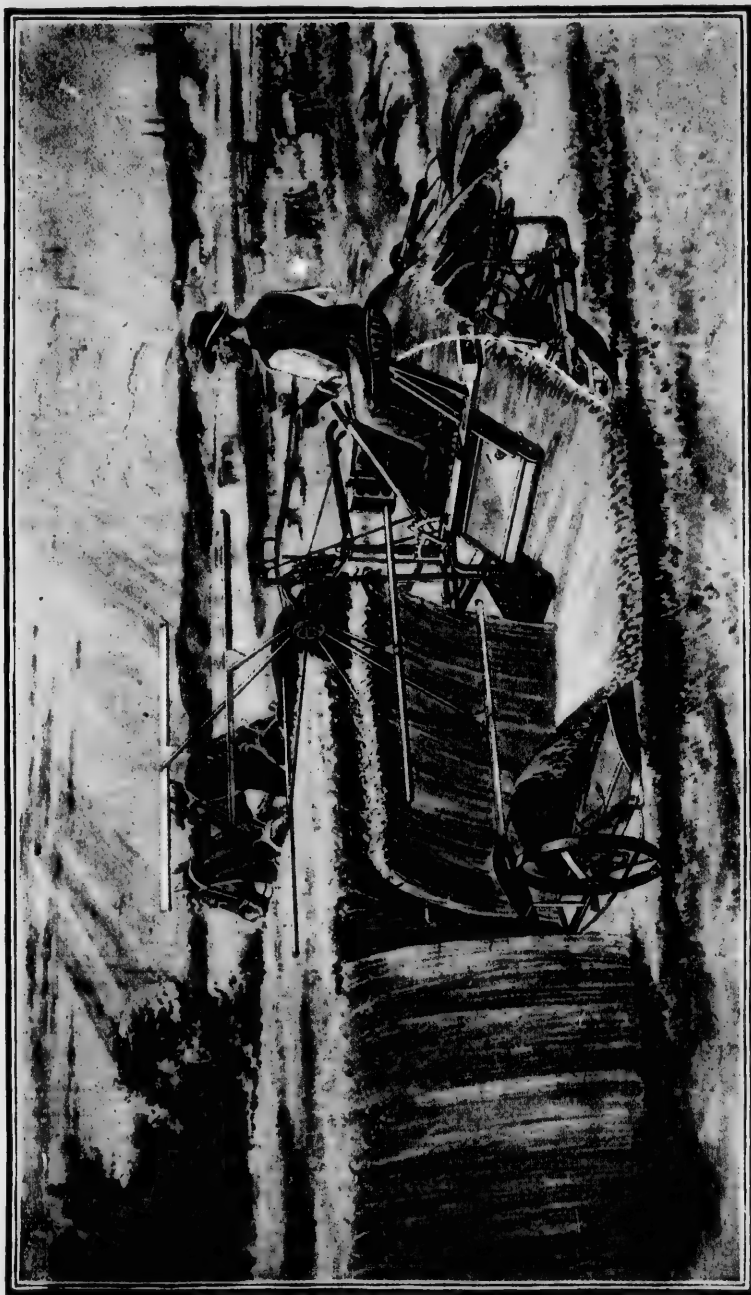
**Shocking
Grain.**

We pointed out above the progress made towards perfection in harvesting implements. An equal advance has been made in threshing machines. In the early history of this country all the grain was threshed with the flail, or trod out with horses or oxen on a floor. In the writer's younger days he has threshed all winter with the flail, from the time it froze up in the fall until seed time the following spring. The first thing we had in the shape of a threshing machine was simply a cylinder set in a frame,

**Threshing
Machines.**

**Flail
Threshing.**

**Modern
Threshing
Machine.**



[51]

28. SELF BINDER.

28. SELF BINDER.

[54]



29. OATS IN LONG SHOCKS.

[55]

with beaters instead of spikes. The grain had to be separated from the chaff and straw by hand. After this there was a succession of improvements, until now we have the self feeding thresher and separator, that will thresh and clean ready for market, and do the work as fast as two men can fork the sheaves into it. (See Ill. 30).

SECTION VII.

SPRING CULTIVATION FOR ROOTS.

Shallow
Plowing.

Sod land that has been plowed and thoroughly prepared in the fall, according to previous directions, and manured during the winter, should be plowed shallow as soon in the spring as the land is sufficiently dry. Then harrow and cultivate it with a spring-tooth cultivator having narrow points. (See Ill. 10). If the soil is clay the land should be thoroughly subsoiled with the spring-tooth cultivator by changing the teeth, and putting on the chisel pointed subsoilers (see Ill. 10 $\frac{1}{2}$), using four horses, and going both ways (crossways). In this manner the work can be done effectually.

Subsoil
Clay Land.

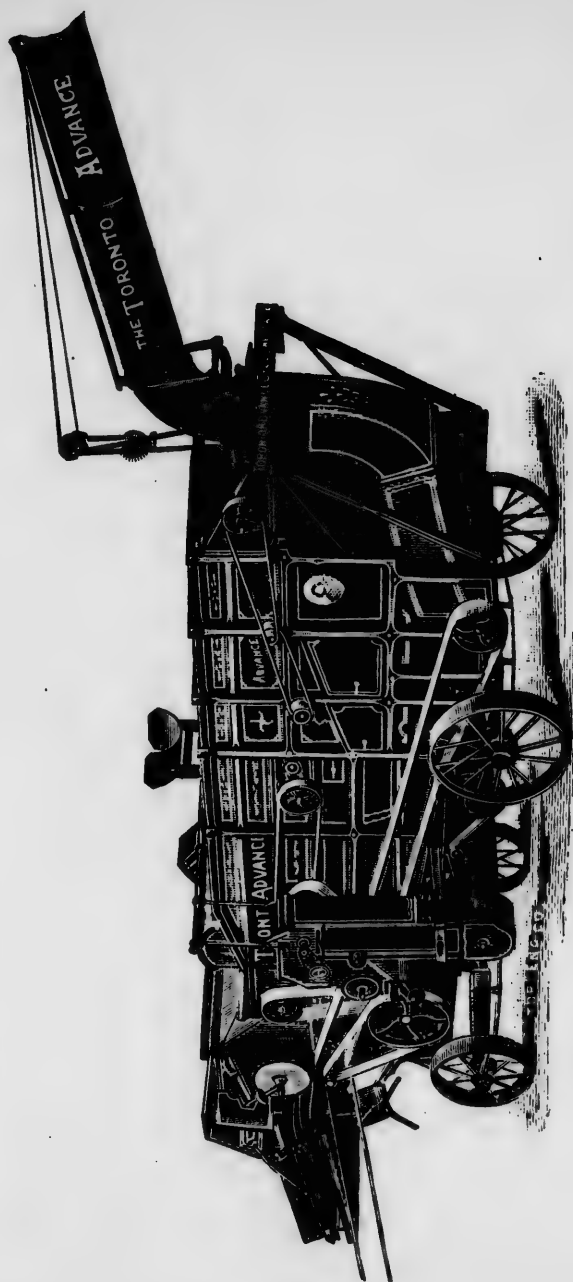
Shallow
Drills.

After subsoiling cultivate and harrow until there is a fine tilth, then roll. While good results are produced from sowing on the level, still, the writer prefers shallow drills, which are made with a double mould board drill plow with marker (see Ill. 13), so that the drills are of

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30. MODERN THRESHING MACHINE.

equal width. This is an advantage for horse hoeing.

**Making
Drills.**

In making the drills have the mould board set wide, so that the furrows will meet at the top without going deep, as the composition of the drills should mainly be rotted sod and farm manure, which makes a complete fertilizer for growing roots and corn. The drills for mangel wurzels and other field roots should be thirty inches in width.

**Sowing the
Seed.**

The seed should be sown with a horse turnip drill, as it is commonly called. (See Ill 31). This machine sows two drills at a time; it has concave rollers, so that it is adjustable to any width of drill. It has two stationary cannisters with revolving shafts, on which are attached brushes to force the seeds out of the holes, which can be adjusted for the different kinds and sizes of seeds to be sown.

**Quantity of
Seed per
Acre.**

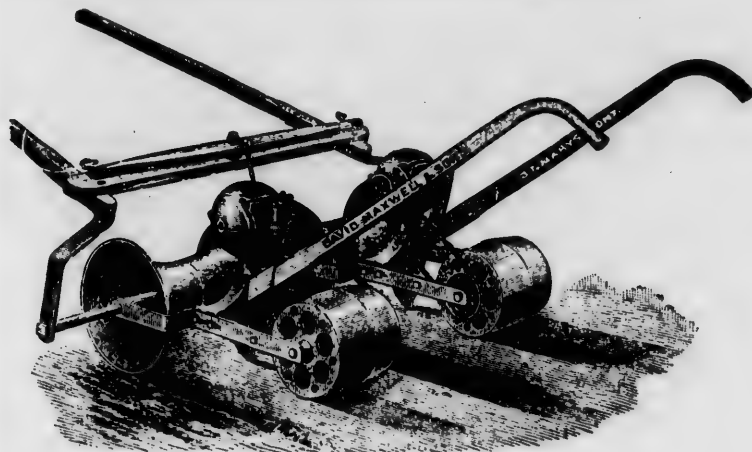
The quantity of mangel wurzel and sugar beet seed advisable to sow is four pounds per acre. Less seed will do, but in order that there should be no blanks or spaces, it is better to sow plenty of seed. With carrots three pounds per acre is quite sufficient. These and the mangel wurzels should be sown the end of April or as early in May as the land can be got in proper condition.

**Cultivation
After
Sowing.**

As soon as the drills become dry after sowing, roll them down with a heavy land roller. This will assist capillary action so that

the moisture from below will rise to the surface, and to prevent evaporation the surface must be loosened. A very satisfactory implement for this work is the "Breed Weeder" (see Ill. 32) which will cover two drills. It is advisable to take out the two teeth that come in the centre of each drill, so that the seed will not be disturbed. There are several advantages gained by keeping the surface loosened even before the

Pulverize
the Surface.



31. HORSE SEED DRILL.

plants appear above ground. It lets the air into the soil, and prevents evaporation. It also assists the bacteria to act on the humus and make it available for plant food, so that as soon as the plants commence to grow, they are provided with a full supply of soluble food.

Soluble
Plant
Food.

Commence thinning mangel wurzels when the plants are from one inch to one and a half

Thinning
Mangel
Wurzels.

inches high, leaving the plants about twelve inches apart in the row. It is scarcely ever necessary to stoop and use the fingers. The work can be done with the hoe which is made for the purpose. (See Ill. 33). This hoe should be kept quite sharp, and square at the corners. The operator walks at the side of the drill, and draws the soil on the near side, and pushes the soil on the far side, and with the corner of the



32. BREED'S WEEDER.

Thinning
Mangels
and Carrots.

hoe cuts out unnecessary plants, leaving only one plant in a place. A man who understands how to do this work properly will hoe and leave in good shape from half an acre to one acre per day. Carrots take more time, as they require to be left closer, not more than eight to ten inches apart. The "Breed Weeder" is the only implement required until the plants are from two to three inches high; then the "Horse Hoe" (see Ill. 34) should be used frequently

during the growing season. On no account should a crust be allowed to form on the surface. All root crops should be cultivated on the level.

The Mammoth Long Red variety of mangel wurzels, as a rule, is the heaviest cropper. The Giant Yellow Intermediate is a close rival. These will average, under favorable conditions, a yield of thirty tons per acre. It is generally supposed that the yellow mangels are the most nutritious, but according to analysis, there is very little difference. One objection to the long red is that when harvesting and putting in the cellar, many of them are broken, which

Varieties of
Mangel
Wurzel.



33. TURNIP HOE.

injures them for keeping during the winter. The broken or bruised should be fed first.

The best variety of sugar beet for farm purposes is the new Danish variety. It is a heavy cropper; one which will average, under favorable circumstances, between twenty-five and thirty tons per acre. It stands well out of the ground so that it is easily harvested. Sugar beets are more nutritious than any other field root, and will keep longer.

Sugar
Beets.

Yield of
Sugar
Beets.

In Central and Northern Ontario the time to harvest mangel wurzels and sugar beets is from the fifteenth to the twenty-fifth of October.

Time to
Harvest
Mangels and
Sugar Beets.



34. HORSE HOE OR SCUFFLER.

When pulling twist the tops off by hand, as when topped with a knife they are more liable to decay. For convenience in loading into the waggon, throw four drills into one row. Providing there is no danger of frost, allow them to remain on the ground for twenty-four hours after being pulled and topped, as this will improve them. If there is any indication of frost, they should be either housed or covered every night, as three or four degrees of frost will injure mangel wurzels and sugar beets.

**Pulling and
Topping
Mangels.**

In putting roots into a cellar, it is advisable to run them over a slatted shute, so as to riddle out the earth. No tops should remain on the roots, as they will soon decay and injure the roots. Where the roots drop into the cellar they are liable to heat, unless an opening is made (funnel shaped) nearly to the bottom. There are two important matters in connection with the successful storing of roots. The first is to keep them sufficiently cool, the second to prevent them being frozen. To accomplish this stone basements underneath barns should be sheeted and battened on the inside of stone wall, and also sheeted overhead or under the upper floor.

**Storing
Roots.**

**Making
Cellar
Frost-proof.**

The principle of ventilating a root cellar is the same as is required to cause a draught in a stove. The openings above are useless without small openings below, similar to a damper in the front of a stove. In a root cellar a number of

**Ventilating
Cellar.**

small drain tiles can be put in the bottom of wall next to cattle stable, and near to the top of the same wall have large openings which remain open all winter. The outside windows should be kept open every day until the winter sets in, say until the beginning of December. About the twenty-fifth of December it will be necessary to bank up the windows with stable manure to keep out the frost.

**Pitting
Roots.**

Where there is not sufficient cellar room the balance of the roots may be pitted successfully.



35. ROOT PIT.

Mark out a long pit of the required length, and about six feet wide, and excavate three or four inches. The earth should be laid along the sides. Dumping carts are more convenient than waggons for unloading roots into pits.

**Making a
Pit.**

**Covering
the Pit.**

Build the roots up to a point four or five feet high (see Ill. 35), then cover with straw about three inches, and with earth six inches. This covering is sufficient until the end of November, then recover with an addition of

three inches of straw and twelve inches of earth. In order to get sufficient mould it is advisable to plow around the pit a number of furrows, in depth not exceeding nine inches, as the surface soil, which is composed of vegetable matter, is more impervious to frost than clay. To make provision against excessive frost it is advisable to cover the pit, the last of December, with stable manure to the depth of about ten inches.

Covering
Pit for
Winter.

To ventilate a pit set three-inch drain tiles on top, with one end resting on the roots; place about eight feet apart. Near the bottom of pit put two-inch tiles, about eight feet apart, so as to cause a draught. Fill the tiles with straw in December.

Ventilating
the Pit.

For field culture the White Intermediate carrot is unquestionably the most profitable variety for a farmer to grow for feeding purposes. The nutritive value is equal to any of the white varieties, and it is much more easily harvested than the others. For yield it takes the lead. Under favorable circumstances this carrot will yield from twenty-five to thirty tons per acre.

Variety of
Carrots.

The cultivation of carrots is similar to mangel wurzels and sugar beets, with the exception of thinning. The carrot plants should be from eight to ten inches apart in the row. The time to harvest is the last week in October. In harvesting, the tops can be readily taken off

Yield per
Acre.

Cultivation
of Carrots.

Harvesting
Carrots.

with an ordinary hoe while the roots are still in the ground. Then, with an iron plow without the mould board, the roots can be turned out. The plow should be run only sufficiently deep that the share will cut the points off the roots. This work may be done first, and top them with a knife. A very little frost will injure them after being pulled, so that it will be necessary to cover them at night if there is any danger of frost.

**Carrots for
Horses and
Cows**

**Beets
Replacing
Carrots.**

Carrots are grown chiefly for feeding to horses and milch cows. The Danish sugar beet is taking the place of the white carrot on account of its better keeping qualities and greater nutritive value. The same method of keeping mangel wurzels and sugar beets during the winter is required for the keeping of carrots.

**Swede
Turnip.**

There are many varieties of the Swede turnip offered at the present time. These have been improved from the original "Skirving," a work which is done extensively by growers of seeds. The type of a root is fixed by growing seed from a certain type for a number of years. It would be difficult to say what purposes, is the leading Swede of the present time. While some of the newer varieties are large and smooth, their quality for table use may not be equal to that of some others. As a rule, the bronze top varieties are superior to the purple top for table use. In some sections of the country the practice of growing Swede turnips

**Improving
Swedes.**

**Green Top
Swedes.**

for export to the United States, for table use, has become quite an extensive business. As to the wisdom of this is another matter, for, aside from the ready cash derived, we must consider the fact that it takes double the *nutriment* from the soil to produce a crop of turnips that it does for a grain crop.

Again the farmer should consider the great loss of fertility to the soil by selling and shipping the whole product instead of feeding it on the farm, and returning it again to the soil, as only a small percentage is retained by the animals for the production of beef or milk.

In preparing soil the previous fall for Swede turnips, while it is preferable to have the land manured and ribbed, it is not so important, as turnips do not require to be sown as early as mangel wurzels, sugar beets and carrots. It is advisable to have Swedes follow a cloversod which has been thoroughly decomposed, and has been manured in the fall or during the winter with about fifteen waggon loads of farm manure per acre, and the same thoroughly incorporated with the surface soil. Before making the drills, if there is a clay subsoil, it should be loosened as deep as possible, using four horses on a cultivator provided with chisel pointed teeth made for the purpose. (See Ill. 10½).

In order to do the work thoroughly it is advisable to first set the cultivator so as to loosen the ground about eight inches deep, then

Turnips
Should be
Fed on the
Farm.

Turnip
Culture.

Preparing
the Soil.

Subsoiling
with Spring
Tooth
Cultivator.

cultivate across about two inches deeper ; this does more thorough work.

**Drilling for
Turnips.**

The next thing is to harrow and roll the land, before making the drills, which are made the same as for mangel wurzels, shallow, and thirty inches wide.

**Time to Sow
Swedes.**

The time to sow Swedes is from the fifteenth to the twenty-fifth of June. If sown earlier they are liable to be more woody, and are subject to the turnip louse (*Aphis*).

**Quantity of
Seed per
Acre.**

The quantity of seed necessary is from two to three pounds per acre, and is best sown with the ordinary turnip horse drill. (See Ill. 31).

**Conserving
Moisture.**

In twenty-four hours, if the drills are dry, roll them down with a heavy land roller, so as to hasten capillary action, and pulverize the surface, the same as with the mangel wurzels, to conserve moisture. If the surface is kept pulverized there will be no difficulty in getting a catch, even if there should be no rain.

The mode of thinning is the same as mangels, viz., with a turnip hoe. The work should be done early ; while the plants are in the second rough leaf. To secure best results level and thorough cultivation should be continued during the growing season.

**Thorough
Cultivation.**

**Fall
Turnips.**

There are many varieties of fall turnips, and while their nutritive value is not equal to the Swede, yet they have certain qualifications that recommend them to our consideration. Some, being more rapid growers, can be sown later, as

a catch crop, after a crop of early potatoes or clover sod. The last of June or the first part of July is not too late for some of these. They should be sown in shallow drills, and cultivated and harvested same as Swedes, for early feeding.

Cultivation.

Some farmers prefer to sow these on the level, using an ordinary grain drill, each alternate spout being stopped. They then feed them off on the land in the fall. Sheep and young cattle thrive well on this succulent food, and it will be found particularly advantageous when pasture is dry or scanty, as this soiling crop gives stock a good start for the winter.

Among ordinary turnips the most suitable varieties are the Yellow Aberdeen, the Greystone and the ordinary white.

Varieties.

In Northern Ontario the time to harvest Swedes is the last days of October. The first week in November answers in Central Ontario.

Time to Harvest Swedes.

There are various methods of doing the work. Where help is plentiful the old method of pulling and topping by hand, throwing the roots of four drills into one row for convenience in loading into the waggon, is preferable. In many cases, however, other methods have to be adopted in order to save hand labor. One of these is to top the turnips with an ordinary hoe, and drag them out of the ground with the harrows, by harrowing across the drills, letting the harrows half lap if necessary. This method answers very well in sandy soil, but in clay soil

How to Harvest.

the turnips are considerably injured in the process, and, as a rule, there is more earth clinging to the roots than is desirable.

**Different
Methods of
Harvesting
Swedes.**

Another method is to top with the hoe, and cut off the roots with an iron plow without the mould board, and having the wing of share wide and sharp to cut off the roots. The following is generally adopted in some sections: Use a heavy hoe or mattock, both to top and root. This method is becoming popular. Turnips should be left on the ground for a day or more after being pulled, as they are not so easily injured by frost as other roots. Indeed it has been found that three or four degrees of frost rather improves them for keeping.

**Storing
Swedes for
Winter.**

The same directions for storing mangel wurzel, both in cellar and pits, hold in the storing of turnips for the winter.

SECTION VIII.

HOW TO GROW ROOTS FOR EXHIBITION.

It may be interesting to many, especially to young people, to know how to grow monstrous roots for exhibition purposes. It is like feeding and preparing animals to win prizes, which is more for glory than profit. However, it is interesting to demonstrate that a mangel wurzel seed, planted, say on April tenth, will, by the tenth of October, with proper care and surroundings, develop into a root weighing over sixty pounds;

(a bushel) developed from one small seed in six months.

The first thing to be done in the preparation of the soil is to thoroughly underdrain it. Then, in the autumn, open out with a plow where the drills are to be made. In this case the drills should be five feet apart. This will require two rounds, that is four furrows, with the plow for each drill. Then loosen the subsoil with a subsoil plow, after which scatter over a portion of the compost prepared several months previous. When making up the drills incorporate the compost thoroughly with the soil, and, after the drills are finished, spread a covering of the compost over the whole surface to remain as a mulching.

**Making
Drills.**

The compost heap is of the following mixture: Well rotted farm manure mixed with that from pigs, sheep, and poultry. The latter is superior to the others. Decomposed night soil, if obtainable, should be added; incorporate with this considerable old sod and bone dust. Each time the compost is turned over (which should be every two or three weeks) scatter over considerable gypsum to prevent the ammonia from escaping.

**Compost
Heap.**

The seed should be sown early in April. On the drills, at intervals of five feet, sow five or six seeds. After the plants have grown some time thin out to three plants, and eventually to the one most vigorous. Follow the above plan

**Distance
Apart.**

for mangel wurzel and sugar beets; carrots and parsnips two feet apart. Turnips should be sown early in the month of May, and afterwards thinned as above indicated.

Cultivation
for
Monstrous
Roots.

Subsoil between the drills as deep as possible, and sow salt over the whole surface, except on carrots and parsnips, where nitrate of soda should be used instead. Then cultivate frequently during the whole season, and on no account allow a crust to form on the surface. After rain all that is necessary is a garden rake with which to pulverize the surface. In growing mammoth roots and vegetables for exhibiting, much valuable knowledge may be gained by the grower.

SECTION IX.

CULTIVATION FOR POTATOES.

Timing Cold
Clay.

The most suitable soil for potatoes is a thoroughly rotted clover sod, which is prepared by plowing early in the fall, and cultivating and harrowing alternately until the end of October. Then cover with well rotted farm manure, and rib as in the preparation for mangel wurzels. In the spring the cultivation and subsoiling must be thorough. If the soil is a clay it is advisable to sow lime over the surface. Put on about five hundred pounds per acre. It will warm the soil and assist in the decomposition of the vegetable matter.

The drills are opened out with a drill plow, with marker thirty inches wide. These are made from four to five inches deep. Plant medium sized potatoes, cut in sets, with from two to three eyes in each. Drop the sets in the drills, twelve inches apart. Then cover with the same plow, and after ten days harrow down nearly level and smooth with a "Breed weeder." The "weeder" should be used frequently at this stage, and even after the potatoes have made considerable growth. Use the horse hoe frequently during the growing season. The cultivation must be on the level, and on no account should the potatoes be banked up. The last time the work is done the teeth of the scuffler may be changed so as to throw the earth towards the potatoes, and thus prevent their being sunburnt.

**Drilling
Potatoes.**

**Potato
Sets.**

**Horse
Hoeing
Potatoes.**

While there are machines for cutting seed potatoes, and some of them do the work fairly successful, the ordinary farmer is content to cut the sets by hand. To do this work properly cut off the stem end of the potato first. This will invariably have one or two eyes. Then, by revolving the potato in one hand and cutting with the other, cut so as to leave two or three eyes in each set. Then split the seed end. By experiment this has been found to give the best all round results.

**How to Cut
Potato Sets.**

The time to plant early potatoes depends largely upon circumstances. If wanted for the early market, it is necessary to have the land

**When to
Plant
Early
Potatoes.**

thoroughly prepared the previous fall. Plant about middle of April. The soil, being cold so early in the season, lime may be used to advantage in warming it, so as to make the plant food available. In all cases it is advisable to plant early varieties early in the spring, so that they will be matured before the hot, dry weather in July.

**When to
Plant Late
Potatoes.**

It is better not to plant late varieties until the end of May, in order that they will keep on growing during the hot weather, and be ready to harvest by the tenth of October.

**Varieties to
Plant.**

To recommend, from the long list grown at the present time, the best variety to plant is a difficult task, and an unsatisfactory one; more especially as potatoes "run out" so quickly, and those varieties which are most popular at the present time in a few years may be far behind some other varieties now unknown.

**Early
Varieties.**

The "Early Rose" may be considered an exception, for whereas this variety held first place for many years, it is to-day a close rival for first place as an early variety. The "Early Market" and "Early Ohio" are among the first of extra early varieties, and "Rose of the North" for second early.

**Late
Varieties.**

Among the late varieties at present the "Empire State" stands among the first at the Ontario Agricultural College.

**Harvesting
Potatoes.**

There are many kinds of implements used in harvesting potatoes, ranging from the spading

fork to the expensive combined digger and picker. The common plow, however, is generally used, although the Dennis potato digger (see Ill. 36) is a decided improvement, as with it the potatoes are nearly all spread on the surface, ready to be picked up. The potato digging attachment for the drill plow (see Ill. 13) works satisfactorily.

Potatoes will keep much better during the winter if, after digging, they are pitted in the field for ten days that they may sweat. Cover

Pitting
Potatoes.



36. DENNIS POTATO DIGGER.

the pit with straw and a light covering of earth. The straw prevents the earth mixing with the potatoes.

Store for the winter, and ventilate according to the directions given for mangel wurzels. Potatoes stored in pits are usually firmer and of better quality in the spring than those stored in cellars.

Storing
Potatoes.

SECTION X.

RAPE SEED.

"Dwarf Essex" rape is a succulent fodder plant that should be cultivated more extensively in this country than it is, as it grows luxuriantly, and is of great value as a fodder. An ordinary crop will yield over twenty tons per acre of a most nutritious food. By sowing, say half an acre or more, early in May, it will be ready in July for the lambs at weaning time, and for young growing pigs. It can either be fed on the land or carted to the stables.

When to Sow.

The general crop should be sown from the twentieth of June to the first of July. The same preparation of the soil is required that is necessary for a root crop. Rape grows to the greatest perfection when sown in drills, the same as turnips. The drills should be twenty-five inches wide, and two pounds of seed per acre is sufficient.

Cultivation.

The cultivation is similar to that of turnips, excepting that hand hoeing is not necessary. Rape can be grown successfully as a catch crop after early potatoes or grain are harvested.

Feeding Rape.

All animals do well when fed a daily ration of rape during the fall. Milch cows may be fed a limited quantity at noon each day, until January first, without injury to the milk. In order to keep rape for early winter feeding it

should be cut about the twentieth of November with an ordinary scythe, and forked into heaps and carted to the stable as required. When frozen leave it in the stable to thaw before using.

Rape for
Early
Winter.

SECTION XI.

PREPARATION FOR CORN.

In the preparation of the soil for corn we must take into consideration that this plant is, to a certain extent, semi-tropical, and is better adapted to a warmer climate than ours. However, by preparing the soil with a view to keeping it warm during the growing season, we may expect good results. In the first place, the land, a well rotted clover sod, must be either naturally or artificially drained, and thoroughly cultivated and manured the previous fall, the same as is done for roots. If the land is manured during the winter it will be necessary first, in the spring, to gang plow it shallow, say three or four inches deep, so as to incorporate the manure with the surface soil. Then harrow and cultivate thoroughly, and before sowing, if a clay subsoil, loosen as deep as possible, and harrow until the land is in fine tilth.

In Central and North Ontario, as a rule, the best results are obtained by sowing silage corn about the twenty-fourth of May.

Time to
Sow Corn.

There are many varieties to choose from in making a selection. Every farmer will have to

Variety to
Sow.

**Varieties
for
Northern
Ontario.**

be governed according to soil and locality. In Southern Ontario a later and larger variety can be grown than could be further north. It is useless to grow a variety for silage which will not be in a firm, dough state by the fifteenth or twentieth of September. The "flint" varieties are invariably earlier than the "dents." For Northern Ontario I would name "North Dakota" and "Compton's Early," both of which are flint varieties. The former is white and the latter yellow. From the roots of these, and many other flint varieties, grow up a number of shoots, which makes the harvesting more difficult, when done by hand, than if "dent" varieties are used. For Central Ontario, larger and heavier yielding varieties may be grown, viz.: "Mammoth Cuban" and "Wisconsin Earliest White Dent." These are both dent varieties, and throw up no shoots. Under favorable circumstances they will yield twenty tons per acre, one-fifth of which will be ears. While the bulk yield of the flint varieties named is rather less in the total than the dent varieties, the proportion of ears is about the same.

**Soiling
Corn.**

For cutting and feeding green, the sweet varieties are considered preferable. "Mammoth Sweet" is one of the heaviest yielders, and is of fair quality.

**Planting
Corn.**

There are several methods of sowing or planting corn, each of which has advantages under certain conditions. If the land has not

been thoroughly cleaned of weeds and weed seeds the previous fall, it is necessary to plant in hills, so that the land can be cultivated both ways. This can be done by the use, first, of a corn marker, marking both ways. Drop four or five grains in each cross, either by hand or with a hand planter. (See Ill. 37). The American check row planter is expensive, but does the work satisfactorily. When planting in hills forty inches apart about ten pounds of seed per acre is sufficient.



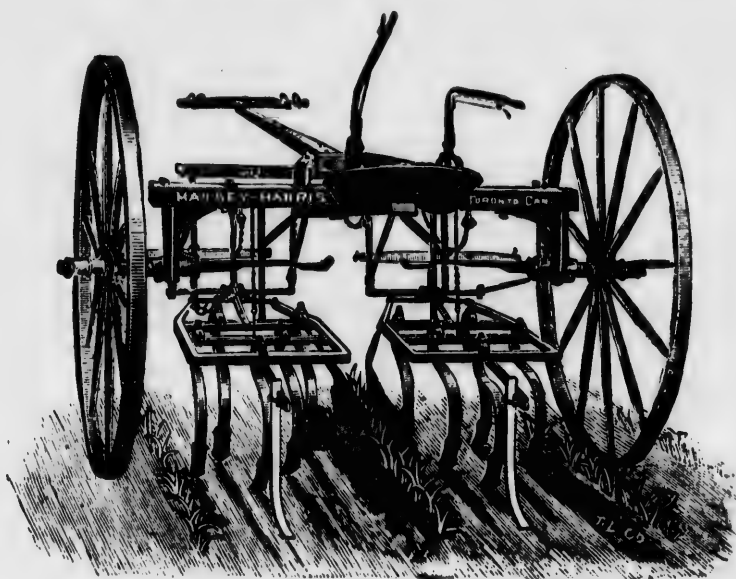
37. HAND CORN PLANTER.

When the land is fairly free from weeds and weed seeds, corn can be sown with an ordinary grain drill (see Ill. 7), stopping all the spouts but two, leaving six spaces, between which is forty-two inches. A drill with an odd number of spouts, say eleven or thirteen, is preferable, as the teamster will not be so liable to make a mistake. A careful driver should make the drills perfectly straight and even, and sow twelve acres per day. Fourteen or fifteen pounds of seed corn per acre is sufficient. As soon as

Sowing
Corn with a
Drill.

Cultivating
Corn.

sown the land should be crossed with a light harrow or Breed weeder (see Ill. 32), then on the angle and again across, until the corn is up, after which use the weeder lengthwise, covering two drills at a time; taking out two teeth in line with each row of corn.



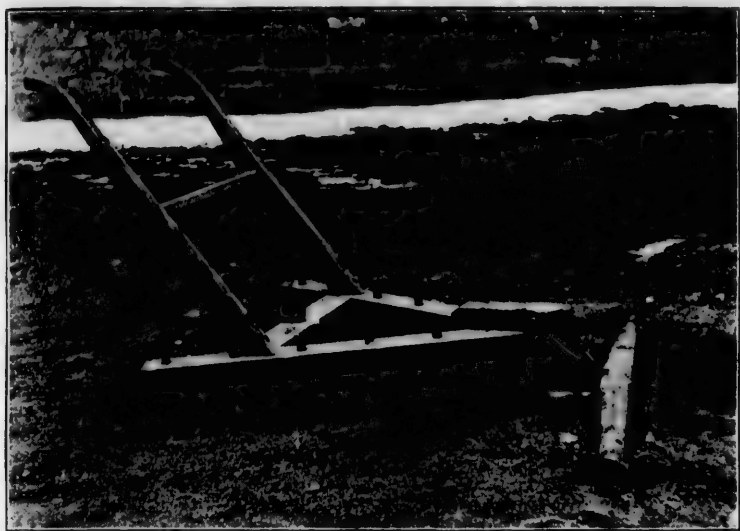
38. CORN CULTIVATOR

Fine Tilth
Necessary.

When the corn is a few inches high start the two-horse cultivator. (See Ill. 38). Use the narrow points first, so as to loosen the soil several inches deep. This is followed with Breed's weeder, to make a fine tilth; and, not only to kill weeds, but to assist the bacteria to act on the *humus*, and make it available for

cont
After
that
Ill. 3
corn
Agriculture

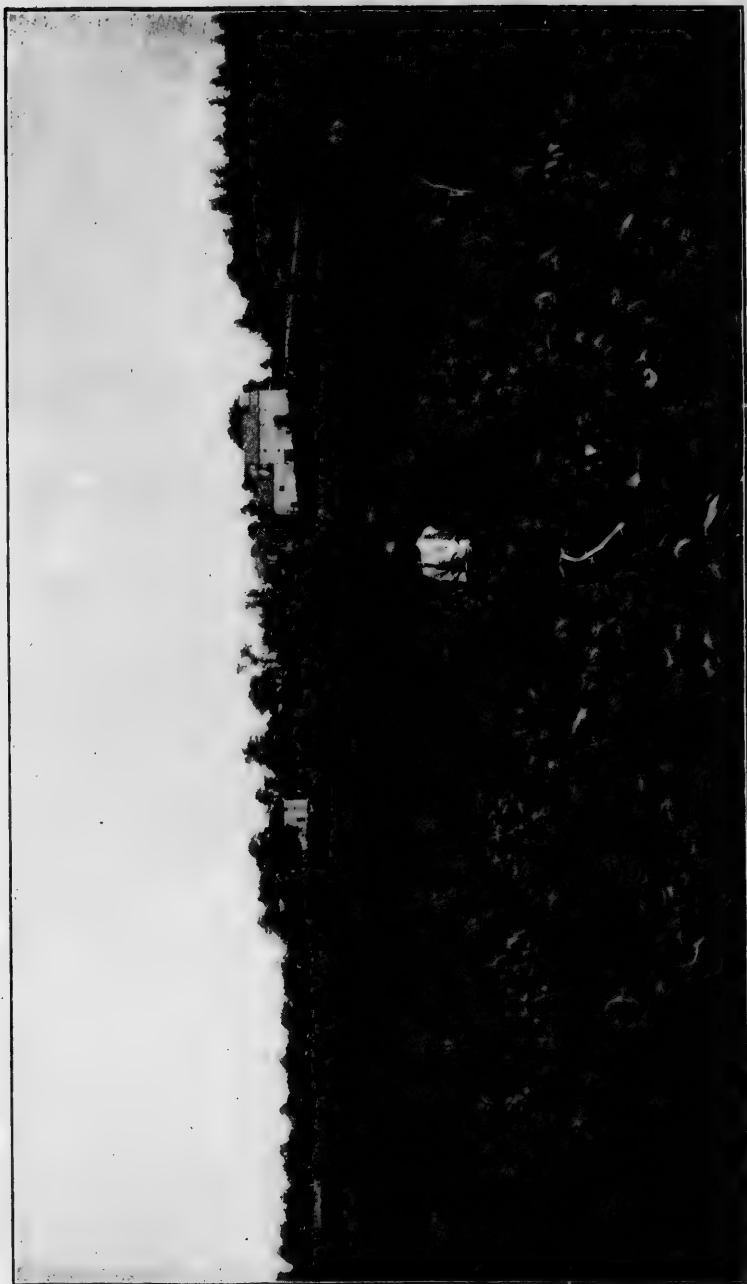
plant food. Corn, being a gross feeder, requires a large amount of soluble food, which can only be prepared by thorough cultivation. The weeder and the two-horse cultivator should be used alternately until the corn is too high to work over, then it becomes necessary to use a one-horse hoe (see Ill. 34), which should be



39. CORN PULVERIZER.

continued until the corn is about six feet high. After this a scuffler with harrow teeth is all that is required to pulverize the surface. (See Ill. 39). All cultivation may cease after the corn is in tassel. See last scuffling at the Ontario Agricultural College, 1899. (See Ill. 39½).

Surface
Pulverizer.



39]. SCUFFLING CORN AT THE ONTARIO EXPERIMENTAL FARM, 1899.

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The time to harvest corn for silage is when it is in the firm, dough state. No mode of harvesting that is altogether satisfactory has yet been found. Until recent years most of the corn was cut with either the reaping hook or corn knife, or with a stone boat having two pieces of saw blade sharpened on the edge and fastened to the sides of the boat. This was not a success.

When to Harvest Corn.

At the present time the two most common implements are the common hoe and the corn harvester. Where labor is plentiful, my idea is, using the hoe (see Ill. 40) has the advantage, since, with it, you can cut close to the ground.

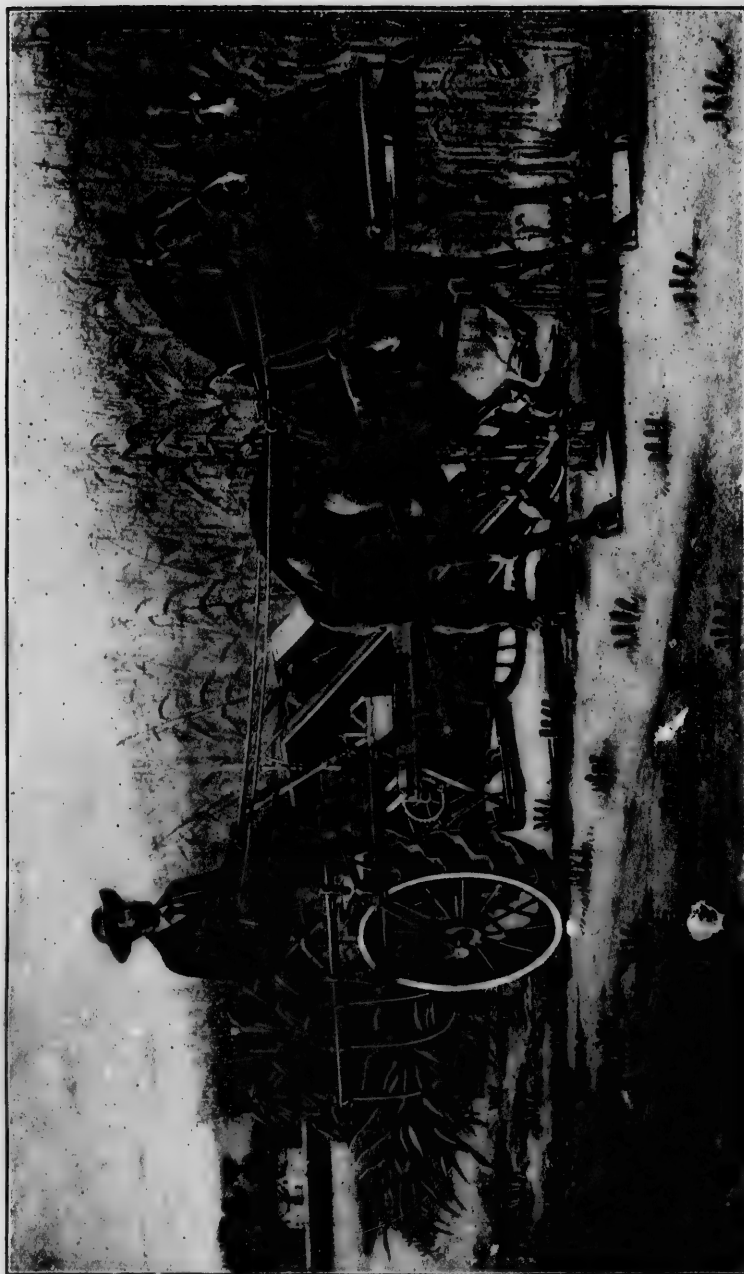
How to Harvest.



40. CORN HOE.

The cost is less than one dollar per acre. With a corn harvester (see Ill. 41) the twine alone costs fifty cents per acre to bind a crop of eighteen tons; this may be saved by dropping the corn in bundles without binding. Whether the corn should be taken to the silo immediately after being cut, depends on its condition. If rather green and full of sap it is better to lay on the ground after being cut, for half a day or more, to wilt, otherwise the silage will be sour. If the corn is frozen the sooner it is put into the silo the better. If it becomes overdry water may be added as the silo is being filled.

Corn Harvesters.



41. CORN HARVESTER.

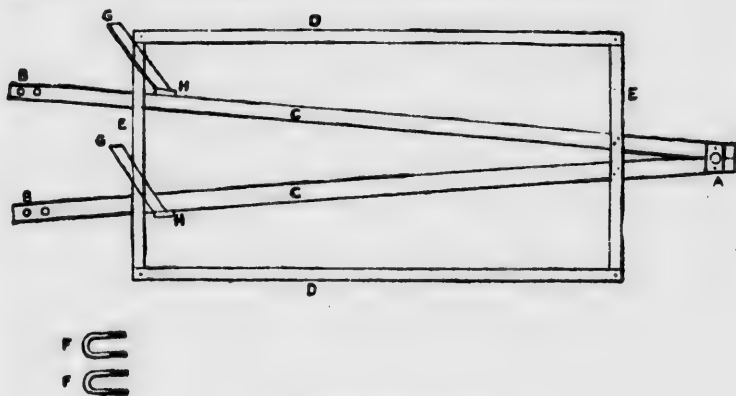
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A low platform, attached to an ordinary ^{Hauling to Silo.} waggon, is what is required for hauling corn to the cutter at silo. (See Ill. 42).

The accompanying cut is a sketch of a homemade platform for drawing corn, used by a good many silo men in connection with ordinary waggon wheels, the reach and front bolster being removed. The two main pieces (C C) are eighteen feet long and eight inches wide by



42. CORN PLATFORM.

three inches thick. The point A rests on the front axle, the kingbolt going through a hole bored where the two pieces come together. B B are bored holes through which the clips (F F), made of three-quarter-inch round iron, pass. These go over the hind axle, and extending down through the planks, are fastened below with nuts, thus holding them to the under side of the axle. The side pieces of platform (D D) are eleven feet long, and the cross pieces (E E)

six feet long and two inches thick—all made of hard wood and securely bolted together. G G are two upright pieces of scantling, five or six feet long, slanting back and upward from (H H) two iron clips fastened through C and bolted at H H. These act like stakes to keep



43. CORN CUTTING AND SILO.

the corn from pressing against the hind wheels. The whole frame should be covered with pine boards. The corn is laid on crossways.

**Silage
Cutter.**

Regarding the best silage cutter, there are several styles, any of which are quite satisfactory. The self-feeding table is an advantage, and the

blower is an improvement over the carriers, although it requires more power. To elevate from eight to ten tons per hour, from thirty to thirty-five feet high, requires an engine of from twelve to sixteen horse power. (See Ill. 43). The most suitable length to cut corn for silage has been a debated question for years, but it is generally conceded that a half-inch cut is about right.

SECTION XII.

OTHER SILAGE CROPS.

In addition to corn, which is preferable to all other fodder crops for silage, are the clovers, which make a good quality of silage, being a nitrogenous food. Clover is specially adapted to feed with corn silage and other carbonaceous foods. Lucerne gives the largest yield of any of the clovers, and, being a perennial, it can be cut in succession for a number of years, if the land receives a top dressing every winter with good farm manure. The time to cut and put it into the silo, is when the clover is in bloom. "Dwarf Essex Rape" will yield a large crop of good fodder for the silo. This will rival the corn for quantity. Then follow "Sorghum," "Millet," "Peas and Oats" (mixed). Many other crops, when cut green, can be put into the silo, and will make a good quality of succulent food for winter. The time has come when silos are no longer an experiment. In sections

Peas and
Oats for
Silage.

Canada
Thistles
for Silage.

Covering
the Silo.

Time
Required
to Cure.

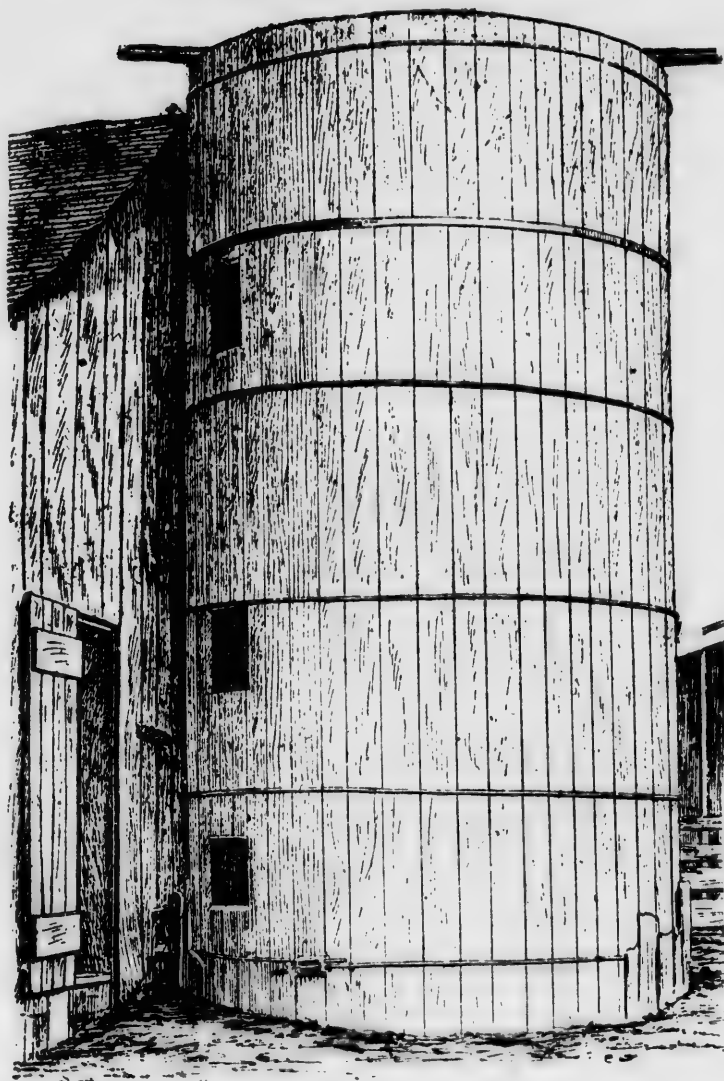
Construc-
tion of Silo.

Round
Stave Silo.

of the country where corn cannot be grown successfully, every farmer should build a silo and fill it with some green crop adapted for that section of the country, even if it should be Canada thistles and other weeds. In filling a silo with corn, or any other fodder crop, it should be kept level and tramped, particularly around the sides, as this will assist in excluding the air, and after fermentation commences the silage will settle quite rapidly. As soon as the silo is filled, or say all that is to be put in at that time, scatter salt over the top, then cover with five or six inches of chaff or cut straw, and sow over it barley or oats, and water it every day for a few days until the grain commences to grow, which will make a close covering that will exclude the air. A cloth saturated with crude petroleum makes a good covering, but the cloth will not last longer than two years.

It requires five or six weeks for silage to cure and be ready for feeding. In the meantime, it is well to have sufficient corn shocked either in the barn or outside, to cut daily as required for feeding.

At the present time there are several styles of silos in use, which are constructed of various materials. To decide which is preferable, will depend to a certain extent on circumstances. The round stave silo (see Ill. 44) has certain advantages. It is simple in construction, and is the cheapest. The cost will be about seventy-



44. ROUND STAVE SILO.

five cents per ton. That is, a silo of one hundred tons capacity will cost about seventy-five dollars. Most farmers will have no difficulty in constructing a stave silo. The staves are cut generally two by six inches, the length varying according to the height of the silo. For a thirty foot silo, use staves sixteen and fourteen feet and joined alternately, so that the joints will not be opposite each other. The joints are made by sawing a groove in the ends and fitting in a piece of hoop iron. It is advisable to have a cement floor in the silo. The hoops may be made of heavy band iron or three quarter inch round, each hoop in two sections, so arranged that they can be tightened or loosened as required. In making connections use a block of wood or casting. (See Ill. 44).

Portable
Silo.

Openings eighteen by twenty-four inches each, four feet apart, can be cut after the silo is built to throw out the silage. Cut in a slant so that they will fit closely. The stave silo has the advantage of being portable, so that a farmer on a rented farm can take it with him at the expiration of his lease.

Bricking
Inside.

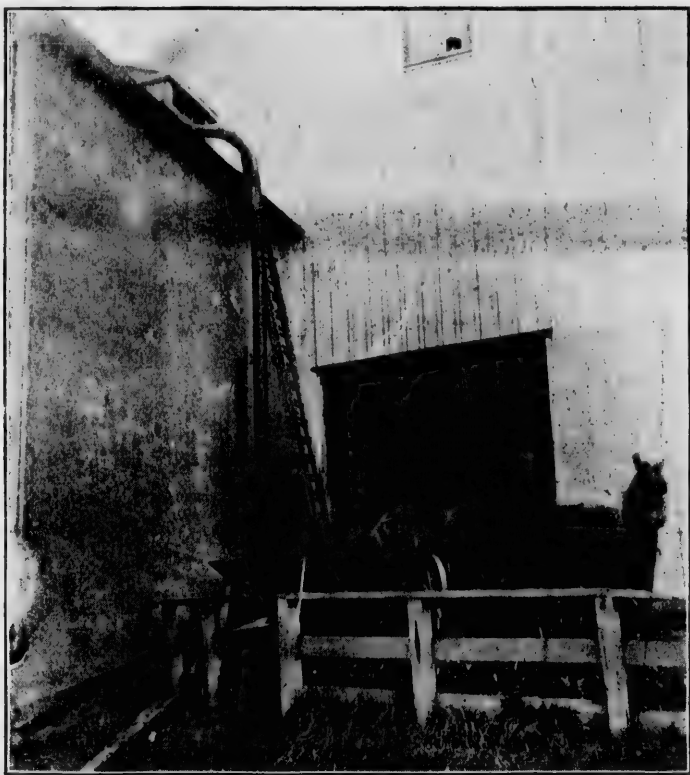
The stave silo can be improved very materially by bricking it up inside, four inches thick, the same as wells are bricked, and plastering inside with cement. This makes the silo air tight and frost proof, which are two very important matters necessary to secure a good quality of silage.

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A second form of wooden silo is here shown (see Ill. 43), which is more substantial than the stave, and is perfectly air tight. A similar one is used in the dairy department at the

Second
Round Silo.



46. CONCRETE SILO AT THE ONTARIO EXPERIMENTAL FARM.

Ontario Agricultural College. The frame work is made of two by six inch uprights, and fifteen inch centres, for a silo thirty feet high. The uprights may be farther apart for a lower

silo. The inside sheeting is two layers of half-inch lumber, with the tar paper between. The outside is of half inch matched lumber. Openings must be made at the top and bottom for air, between the outside and inside sheetings. These should be covered with wire screen to prevent mice getting in. Doors, eighteen by twenty-four inches, can be cut after the silo is built, and at intervals of four feet on the side most convenient for feeding. The cost of the above silo is about one dollar and a quarter per ton capacity.

Cement Silo.

For a silo that is durable and satisfactory in every respect I would recommend the cement silo. (See Ill. 46). As a rule these are built

Octagon.

square; occasionally one is built octagonal in shape. By building these designs, iron rods can be built in the walls, near the top, to bind the structure together, so that an opening can be left from top to bottom instead of using doors through which to get out the silage. These openings, twenty inches wide, are closed when the silo is being filled by setting in inch boards one foot wide, nailed together with an overlap of two and a half inches, to break the joints. Set them against cleats nailed to the door frame, two inches back from the inside face of the wall, so that, when set in place, the boards are even with the wall. These boards are set in as

Square Silo.

the silo fills, and taken out and tacked about four feet above, as the silage is taken out from

the top. This is a very convenient way of getting the silage out. There is an advantage in building a long silo so that a partition can be put across, in order to make two compartments, one of which is about double the size of the other. The ensilage of the large compartment is reserved for winter feeding, and the smaller for summer use. It does not require a mechanic to build a cement silo. It is scarcely necessary to give details in this work, as the manufacturers of cement send a man, free of charge, to instruct their customers how to construct silos and other farm structures. The cost of building a cement silo is from one dollar and a quarter to one fifty per ton, for total capacity. When building a cement silo the walls may be filled with large field stones, which lessens the cost very materially, but the stones must be kept two inches from the sides of the silo, otherwise the silage next the stone will be injured, through freezing and thawing.

Partition
in Silo.

In estimating the capacity of a silo, allow forty pounds per cubic foot for a silo twenty-four feet deep and under, and forty-five pounds for a silo thirty feet deep.

Capacity
of Silos.

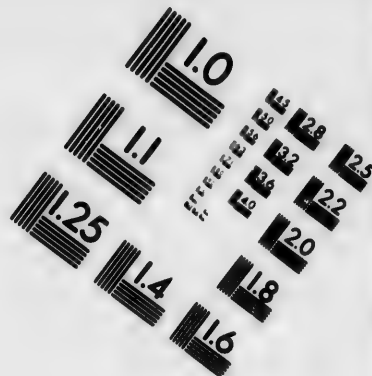
In taking out silage commence at the top, and keep the surface level; a heavy rake is the most suitable for the purpose.

Taking out
Silage.

The amount of ensilage required to winter full-grown animals is about four tons each.

Quantity
Required
to Winter
Animals.

Some are under the impression that corn



6"



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**Dry Corn
vs. Silage.**

shocked in the field, and cut or shredded in the winter as required, is equal in feeding value to silage. According to analysis there is little difference, except that there is less water in the dry corn, but in making practical experiments in feeding there is a very great difference in favor of silage.

SECTION XIII.

FALL CULTIVATION.

**Ribbing
After Corn.**

**Treatment
of Corn
Stubble.**

**Ribbing
Root Land.**

Having now given the cultivation, harvesting and storing of the hoe crops grown on number three section in the rotation for mixed farming, I will now give the fall cultivation of the land, after corn and roots, which is to be followed with spring grain. If the corn land is entirely free from weeds, all that is required is to rib the land with the drill plow, making them twenty-one inches wide, so that there will be a row of corn roots, in each alternate rib the corn rows being forty-two inches apart. If the land is not perfectly free from weeds, an iron plow without the mould board is an excellent implement to turn out the corn roots, so that the land can be harrowed and cultivated with the wide points, and all weeds be cut off. The land should now be ribbed across with the double mould board drill plow so as to put all the surface soil in the centre of the narrow ribs. By so doing the soluble fertility is pre-

vented from leaching away during the winter, as the rains and melting snows will run off in the furrows without carrying away any of the humus. Another advantage is that this allows the frost into the subsoil to loosen it. Land ribbed in the fall will dry out much earlier in the spring, and will make a much better seed bed. The root land cannot be cultivated on account of the tops; especially is this true of the turnip land. If there should be an occasional thistle cut them off with a garden hoe or a spud.

The month of September is a specially good time to cut off all thistles on the farm. Cut close to or below the surface. By so doing the top is prevented from nourishing the root, and the next top will be destroyed by the frost before it is sufficiently matured to feed the root. This severe drain on the root will weaken it considerably, and a heavy crop of clover or grain, the following season, will be free from thistles.

Spudding
Thistles in
September.

All root land should be ribbed (not plowed) in the fall, about twenty-one inches each in width and across, so as to incorporate the tops with the surface soil. Run furrows in the low portions to carry off the surface water. Land which is ribbed will keep much drier than land which is plowed in ridges of say fourteen feet wide. Besides the following crop will be much more abundant, as it will be more uniform.

Rib Root
Land in
Fall.

Why Root
Land Should
Not Be
Plowed.

When root and corn land is plowed in the fall, the following crop will frequently be lodged in the centre of the ridge (where a double portion of vegetable matter has been gathered), and in the furrows where the vegetable matter has been turned off there will not be half a crop. These are facts which are the experience of every farmer.

SECTION XIV.

GRAIN SECTION NUMBER FOUR.

(See Diagram, page 32).

We will now deal with number four section, which is all grain. The fall wheat was sown the previous fall, after the peas, and was seeded with timothy at the same time that the wheat was sown. The Red clover and Alsike are sown in the spring.

Spring
Wheat.

For the past few years spring wheat has not been a success in many parts of Ontario. It appeared to be affected with some sort of fungi, so that it did not mature properly. Many farmers have given up sowing it. Last season (1899) showed the best crop for a number of years. The "Wild Goose" variety has yielded better than any others.

Wild Goose
Variety.

How to
Sow Spring
Wheat.

Spring wheat should be sown as early as possible in the spring, after corn or roots. The ribs that were made up in the fall are harrowed and cultivated down with the spring-tooth culti-

vator, as deep as possible, using the narrow points. Again harrow to make a fine tilth. Then sow the wheat with a grain drill, at the rate of one and a quarter bushels per acre.

Clover and grass seed should be sown at the same time in the following proportions: Seven pounds Red clover, three pounds Alsike, and four pounds timothy. Sow these seeds in front of the grain spouts, so that the seeds will be sown on the surface, and the grain spouts will throw the seeds between the rows of grain, where they will not be liable to be choked out with the grain.

Sowing
Grass Seed.

After the grain is sown harrow across with a light harrow or "Breed's Weeder," to smooth the surface. Do not roll until the land is thoroughly dry, even if, by that time, the grain is three or four inches high. The roller will then pulverize the lumps of earth without making a smooth surface, which would encourage evaporation of the moisture in the soil.

Harrow
After
Seeding.

Oats must be sown in spring the same as wheat, and are best drilled, at the rate of one and a quarter bushels per acre, and seeded with same grass mixture as with the spring wheat. A change of seed grain is desirable every few years.

When to
Roll Land.

Oats.

It is well known that oats develop to greater perfection in Great Britain than in Canada, and a change from there to this country increases the yield very materially. The first

Imported
Seed Oats

year after importation, both the yield and quality are inferior, but after they are acclimatized for several succeeding years, there is a marked superiority over those crops not grown from imported seed. According to experiments at the Ontario Agricultural College at present the variety known as the "Siberian" stands at the head. This is a white oat. Whether we grow the heaviest yielding variety or not is one of the things that makes the difference between profit and loss.

Barley.

While barley requires to be sown early in the spring for best results, it will not stand as much cold and wet as spring wheat and oats. It is advisable therefore to sow the latter first and the barley later. The land is prepared for barley same as for wheat and oats, viz., by harrowing and cultivating down the narrow ribs made in the fall and sowing with a grain drill at the rate of one and a half bushels per acre of the heaviest yielding variety known.

**Importing
Seed Barley.**

According to experiments, the "Mandscheuri" barley stands highest as to yield. We should also import a change of seed barley every few years, from either Great Britain or Europe, where the grain grows to greater perfection than in this country. The "Mandscheuri" variety was imported from Russia. Barley ground should also be seeded down with the same mixture as the spring wheat and oats,

so that the whole section number four will be in grass the following year.

While it improves barley to cover the shocks with caps, it is a question whether or not it will pay to do so. It is true that the same caps may be used for the clover; a great advantage in a wet season.

Caps for
Barley.

As soon as each of the grain crops is harvested, and before the stubbles are horse raked, if there should be any portions rather thin of clover through the grain lodging, or from any other cause, it is advisable to scatter seed over these places by hand, or with a grass seeder. By fall these parts will have made sufficient growth to stand the winter, and thus a uniform crop the following season will be more assured.

Seeding
Thin Places.

The following year number one section (see Ill. page 32) will be in hay or pasture, as desired. If the soil is in proper condition, it will require no attention further than to keep all live stock off it. Pasturing stock early in the spring, as soon as the grass begins to grow, is an injury to both the grass and the animals. Harrowing meadows and pastures in the spring with a chain harrow improves them. (See Ill. 47). It pulverizes and smooths the surface, and consequently hastens vegetation.

Number
One Section.

In deciding on a mixture of grass seed the first thing to consider is the soil, and purpose for which it is seeded. For hay it is necessary

Seeds for
Meadows.

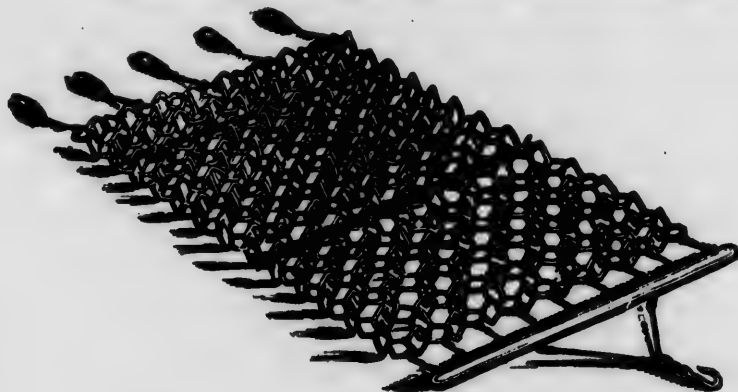
to sow a mixture which will mature at the same time.

**Seeds for
Pasture.**

For pasture, although it is not absolutely necessary, it is preferable to sow varieties that mature at different times during the summer.

**General
Mixture.**

In a rotation where the crop will be required both for meadow and pasture, and where the land varies, so that some portions are dry whilst other parts are wet, the mixture recommended previously will give general satisfaction, viz.:

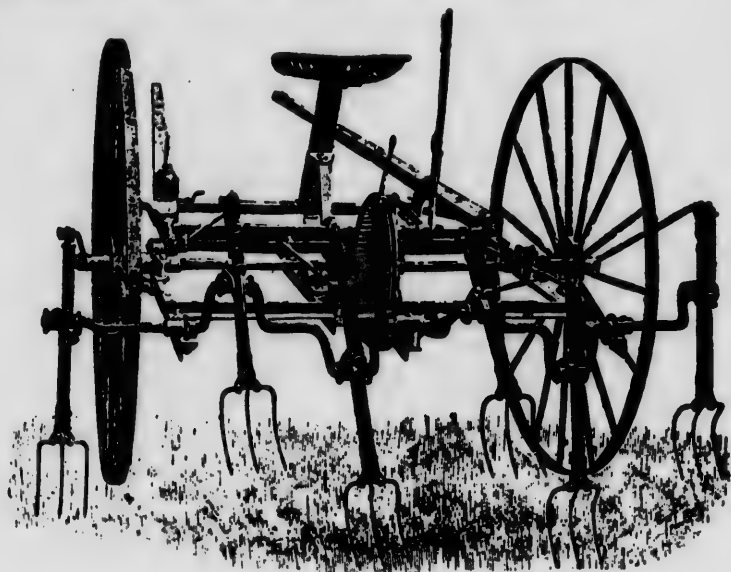


47. CHAIN HARROWS.

Seven pounds Red clover, three pounds Alsike, and four pounds timothy per acre. The first crop will be nearly all Red clover if the land is dry. The wet portions will yield mostly Alsike and timothy. The second year the crop will be nearly all Alsike and timothy, as the Red clover is a biennial, while the Alsike and timothy are perennials. Whereas it is not always necessary to mix any of the grasses with the clovers, it

is always advisable to sow clover with the grasses, which latter are nitrogen feeders, and must have it in the soil, otherwise they will become sickly. It is well known that timothy sown without Red clover will soon run out, whereas, if sown with Red clover it will grow

Sow Clover
with
Timothy.



48. HAY TEDDER.

luxuriantly for several years after the clover dies out.

As a fertilizer our common "Red" clover is a most valuable plant. It collects the free nitrogen from the air, and deposits it in the roots, near the surface of the soil, through the bacteria of nitrification. The tap roots strike deep into the subsoil, and bring up soluble mineral matter

Clover as a
Fertilizer.

sufficient to develop the plant, and this is made available to feed other crops. Thus, by growing clover, in a short rotation of crops, the fertility of the soil can be maintained. Again, the clover roots perforating the subsoil and decaying, leave it more porous than it can be made with any implement.

Clover as a
Subsoiler.

Clover for
Feed.

According to analysis clover hay, when properly cured, is worth considerably more than any other hay for feeding live stock of all kinds,



49. HAY CAP.

including horses and pigs. It is the best flesh former and strength giver. It improves and balances the other rations, so that there will be less waste when feeding concentrated foods.

Curing of
Clover.

The curing of clover is an important matter. It should be cut when coming into full bloom, and be shaken out with a hay tedder (see Ill. 48) soon after being cut. When it is

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sufficiently dry rake it into wind-rows and put into ricks. All that was cut in the forenoon might be thus put up in the afternoon, or more if the weather is hot and dry. The proper place to cure clover is in the rick. Hay caps (see Ill. 49) are very little used in this country, on account of the expense, as they cost about thirty cents each.



50. SELF RAKE REAPER.

The province of Ontario is especially adapted to the growing of both Red clover and Alsike, and an immense quantity is exported to Great Britain and Europe annually. The seed from Alsike matures in the first growth, as it is fertilized by the honey bees distributing the pollen as soon as it comes into bloom.

The seed from Red clover is matured in the second growth, on account of the fertilization

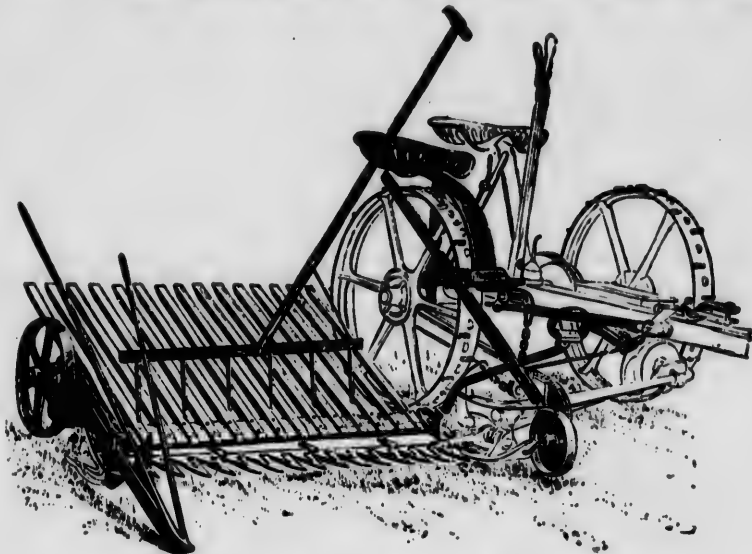
Clover Seed.

Fertilization
of Clover.

being done by the young bumble bees which are not sufficiently developed for the first growth of clover, as they are all hatched in the spring; only the queen bumble bees live through the winter.

When to Cut
Clover.

To get the largest yield and best quality of Red clover seed the first growth should be cut



51. MOWER WITH CLOVER SEED ATTACHMENT.

by the fifteenth or twenty-fifth of June. If it has been pastured the cattle should be taken off by the fifteenth, and the land gone over with a mower to cut off any weeds, and also to give the clover an equal start. It is worthy of note here that a heavy growth of clover will check Canada thistles, and materially assist in cleaning the land of weeds.

Cutting clover for seed, both Red and Alsike, is usually done with an old self rake reaper (see Ill. 50), so that the clover can be put off in small sheaves. It requires to be turned occasionally that it may dry thoroughly. This work requires to be done carefully with a straw fork, otherwise the best seed will be lost. A second method of cutting clover for seed is to use a mowing machine, with a platform fastened behind, on which the clover drops. (See Ill. 51). A man puts it off in sheaves, using a fork or rake. It should remain out a week or ten days after being cut, or until it is sufficiently dry to be put in the barn or threshed. The best quality of clover seed, both Alsike and Red, is got by threshing it as taken from the field.

How to Cut
Clover for
Seed.

Threshing
Clover Seed.

The curing of timothy hay as a rule is an easier matter than curing clover. While the very best quality of hay is made by putting it up into ricks and allowing it to stand a few days (see field of hay in ricks at the Ontario Experimental Farm, Ill. 52), this is not always necessary. If the weather is dry and warm, shake out the timothy with the tedder (see Ill. 48) soon after it is cut, and rake it into windrows with a horse rake. (See Ill. 53). If the weather is favorable, timothy hay may be sufficiently dry the day it is cut to be taken to the barn. It is loaded on the waggons either with forks or with a hay loader. (See Ill. 54).

Timothy
Hay.

Curing
Timothy.

In laying out a farm, it is advisable to have



52. HAYING AT THE ONTARIO AGRICULTURAL COLLEGE.

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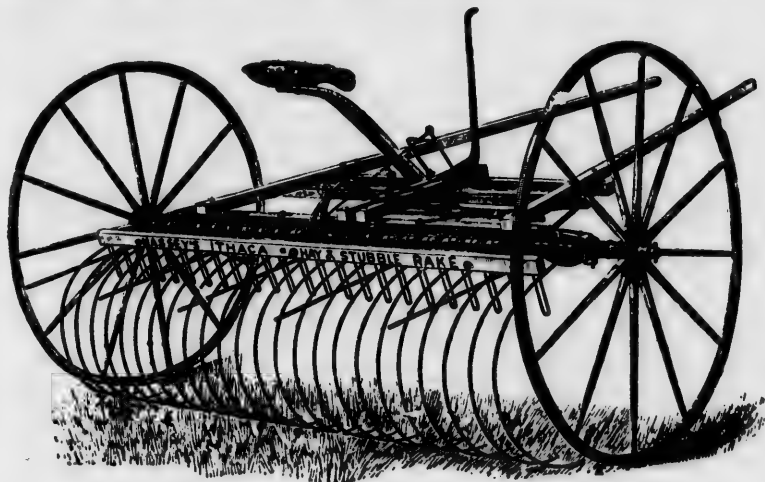
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a field near the barn for pasture and soiling crops. Eight acres, perhaps, is sufficient for permanent pasture. Adjoining this, about six acres might be set apart, divided as follows: two acres of clover, two acres peas and oats (mixed), and two acres of rape.

Permanent
Pasture.

Soiling
Crops.

Before seeding down the portion for pasture it should be thoroughly cultivated, and, if necessary, underdrained; then subsoiled, manured



53. HORSE RAKE.

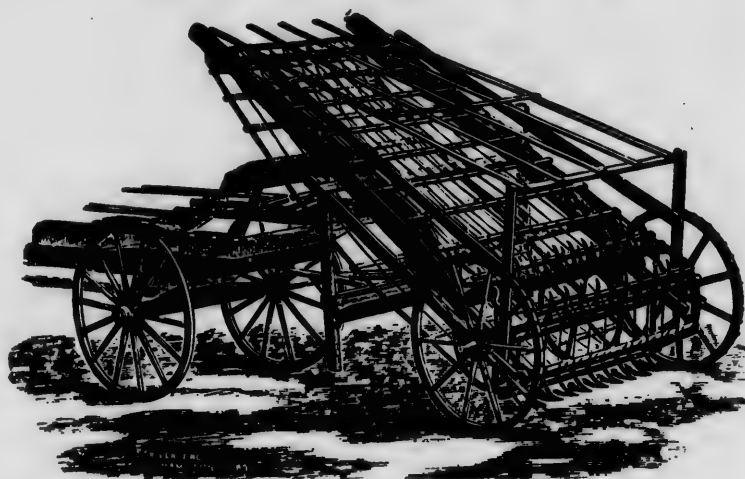
and ribbed in the fall, so that it will be in good shape for spring cultivation, which should consist of harrowing and cultivating the ribs down level. Then, with a grain drill, sow barley at the rate of one bushel per acre. At the same time, sow ahead of the grain spouts the following mixture of grass seed: Lucerne, four pounds; Red clover, three pounds; Alsike, three

Seeding for
Pasture.

pounds; White clover, one pound; Timothy, three pounds; blue grass, three pounds; red top, three pounds; total, twenty pounds per acre. After seeding, level off with a light harrow or "Breed's Weeder."

Shelter for
Cattle.

About two acres of the pasture land should be planted with Maple trees, both for the purpose of ornament and for shelter for the cattle. It is



54. HAY LOADER.

advisable not to seed this portion the first year, as the trees will make more rapid growth by keeping the land cultivated for another year. Mulch with farm manure.

Soft Maple.

Soft maple will make more rapid growth than the hard or sugar maple. The former is desirable in this case, as they are wanted for shelter as soon as possible. It is advisable to

plant the trees not more than twenty-five feet apart, so that the whole surface of the soil will be shaded and kept cool in the summer.

SECTION XV.

ROTATION OF SOILING CROPS.

Soiling crops should be grown in rotation, viz., mixed peas and oats follow rape, the rape after clover.

In sowing the peas and oats which follow the rape, the first acre should be sown as early as possible, the other nearly a month later, when the crop is off, say, by the first of August without plowing. Sow Red clover at the rate of twelve pounds per acre, and thoroughly harrow it in. If the surface soil is composed of "humus" there will be no risk in getting a catch, and a good growth before the winter. The Red clover may be cut green and fed to milch cows and other animals on the farm, and if there is a surplus it can be cured for hay.

Mixed Peas
and Oats.

Clover
Seeding.

In August the clover sod should be plowed about four inches deep, rolled and harrowed, and cultivated several times with the wide points on the spring-tooth cultivator. In October spread farm manure on the surface and cover in ribs. The following spring harrow and cultivate alternately for rape. One acre should be sown at the beginning of May for early feeding, and the other acre a month later.

Fall
Cultivation.

Rape.

It is advisable to sow rape in drills two feet wide, and cultivate according to the previous directions.

**Value of
Rape.**

Rape is one of the best foods for keeping animals (including pigs, sheep, calves and all young stock) in a good, healthy condition. It is an excellent food for milch cows, but must be fed in limited quantities, otherwise it is liable to injure the flavor of the milk.

**Other Hoe
Crops.**

The other acre may be sown with any other hoe crop if so desired. After the hoe crop is taken off, the land should be cultivated repeatedly until fall, then ribbed, and followed in the spring with peas and oats.

**Pasture
and Soiling
Crop.**

With a few acres of pasture, conveniently situated, and such soiling crops as are here named, a large number of animals can be fed cheaply, and, at the same time, give the best results financially.

**Second
Pasture.**

A second pasture of two or three acres, near the barn, is necessary for sheep, calves or pigs. For shelter they require a building to go in at will; all pastures should have a group of maple trees. They grow quickly if cultivated in the summer, and mulched in winter for two or three years.

SECTION XVI.

THREE YEARS' ROTATION.

Having fully explained a four years' rotation of crops, according to the diagram on page 32, which, with certain variations, may be adopted on many farms in this country with success, I will explain, briefly, the advantages and disadvantages of a three years' rotation. Divide the farm proper (that which is under cultivation) into three sections. In brief, omit the second section of four years' rotation. (See diagram page 32). Cultivate as follows: One section in clover, mostly Red, for hay and pasture, is plowed in August, harrowed and cultivated until October, according to previous directions, then manured and ribbed. This is followed with a hoe crop and peas, then with a grain crop, again seeding with clover. This system is desirable where a limited number of animals are kept in the summer, the object being to feed cattle and lambs during the winter for export or home consumption. The advantages in this system are, first, by plowing under green clover (second growth) every third year, and feeding all the roots, corn, fodder and coarse grains; the fertility of the soil is thereby not only maintained but increased. Second, the labor on the farm is more evenly distributed throughout the year by this system. With a disconnected or outlying portion of land it may not be convenient to manure and cultivate in the regular rotation.

Fertility
Increased.

Outlying
Land.

A three years' course may be followed by leaving out the hoe crops and farm manure, viz.; two sections grass, hay or pasture, and the third section grain; seeding with the regular mixture mentioned in the four years' rotation. The section that has been in grass for two years is plowed in August, and thoroughly harrowed and cultivated alternately until October, then ribbed and sown the following spring with grain, and again seeded. With this system fertility can be maintained without applying manure.

**Fertility
Maintained
Without
Manure.**

**Only Two
Years
Grass.**

In any rotation land should not remain in grass more than two years, for the reason that it becomes filled with wire worms, so that the two following crops are more or less injured. Land intended for pasture only should be renovated every few years by plowing in August, and, in order to destroy the wire worms which are almost certain to be in the sod, harrow and cultivate alternately and continuously until the winter, say November or December. The object is, first, to rot the sod, and, second, to rid the ground of wire worms by disturbing them late in the fall or the beginning of winter, so that they will be frozen and thus destroyed.

**Destroying
Wire
Worms.**

**Re-seeding
Pasture.**

Seed again in the spring with the pasture mixture of grass seed mentioned on page 107, seeding with any kind of spring grain (barley preferred), sown according to previous directions.

CHAPTER II.

SECTION I.

BEAUTIFYING THE FARM.

While no class of people anywhere has such opportunities to make a beautiful home as the farmer, beautifying the home surroundings on the farm is sadly neglected, as a rule. The farmer has sufficient land, so that by laying out the grounds around his house artistically he can make the home attractive, and give the place a park-like appearance, such as cannot be done in the city. The artist, in selecting a subject for a painting of an ideal home, invariably selects a country home in preference to a city mansion. There are home comforts and privileges on the farm that cannot be had in any other occupation. It is to be regretted that more farmers do not take advantage of their opportunities, and endeavor to make their calling more elevating and pleasant, so that the young people will not be attracted to our towns and cities.

There is no necessity of making farming a drudgery. There should be system on the farm, the same as in a factory or a business office. Systematized work saves time and labor. While it is necessary to rise early in the morning, say at five o'clock, it is equally as necessary to quit work at six o'clock in the evening, so that there will be sufficient time for reading and enjoyment. Every farmer should subscribe for one or two

Opportunities to Beautify.

Attractive Home.

Painting of an "Ideal Home."

Farm Privileges Elevate Farming.

City Attractions.

Systematic Farming.

Time for Reading and Enjoyment.

Subscribe
for Papers.

good agricultural journals, a religious paper, for Sunday reading, a ladies' journal, and a daily newspaper, so that it will not necessitate any member of the family going to the blacksmith's shop, shoemaker's, the store, or the tavern to get the news of the day.

Demands
Intelligence

Every member of the family should have the opportunity of reading for himself or herself, and so keep apace with the times. The present age demands intelligence in all things. Less manual labor and more thought would bring many farmers better returns than they now enjoy.

Few
Failures.

Farming is more healthful, independent, and interesting than any other occupation or profession. While only a small percentage of business men make a success, only a small percentage of farmers make a failure. This is a well-known fact, and with our present knowledge in agriculture, farming should be made more profitable now than ever before.

Knowledge
of Farming.

Other professions are more than filled, but, as we pointed out, there is a great demand at present for farm managers. Every farmer should have a thorough knowledge of his business, including the cultivation of the soil, feeding and caring of live stock, dairying, horticulture, etc.

Less House
and
Ornament
the
Grounds.

A farm home can be made comfortable and attractive at little cost. Many farm houses are too costly. If one-quarter or even one-third of

the cost had been spent in laying out the grounds, and planting trees properly arranged, it would not only have added to the comfort and appearance of the place, but would have increased the value of the farm much more. Indeed, the value of this cannot be reckoned in dollars and cents. It should be the ambition of parents to make home the brightest and most attractive spot on earth for their family.

In improving a farm one of the first things is to decide what quantity of land is desirable to enclose for orchard, small fruits, vegetable garden, and lawn. Provision should also be made for a small pasture at the back for calves, etc. (See diagram, page 32).

Size of
Grounds.

Having decided on this, clear away all old fences, and rubbish of every kind on the whole space intended to be enclosed.

Clearing
Away
Fences.

If any grading is required it should be done before commencing to cultivate. Do no more grading than is necessary, as grounds have a more natural appearance when they are somewhat undulating. The portion intended for the lawn should be heavily manured with farm manure before plowing. The whole enclosure should be plowed shallow, and thoroughly harrowed and cultivated alternately until the land is cleared of all weeds and weed seeds. The subsoil should be loosened as deeply as possible with the subsoiler.

Grading
Grounds.

Cultivation
for Lawn.

Then prepare a plan and work to it the

Prepare a Plan. same as a mechanic working to a plan prepared for a building. Every farmer will require to have a plan especially adapted for his own place. In preparing this he should consider the location of buildings and the lay of the ground. Getting the desired effect belongs to landscape gardening.

Landscape Gardening. Good ideas of what will best suit circumstances can be got by securing one of those inexpensive books on this kind of work.

Enclosing Grounds. A wire fence should be erected around the whole of these grounds, and evergreen trees planted inside of the fence.

Planting Evergreens. There are none more suitable than the Norway spruce, which answers well both for a hedge and a wind-break.

Hedge. Trees about twenty inches high are sufficiently large. Nursery trees that have been transplanted are preferable, the cost of which is about six dollars per hundred. For a hedge, plant them about sixteen inches inside of the fence, and from thirty to forty inches apart.

Wind Break. For a wind-break they should be planted from eight to ten feet apart. These will grow up with little attention, and will soon become both ornamental and useful.

Double Row Wind Break. For various reasons it is not advisable to plant a double row for a wind-break. In a few years the inside branches die for want of air, and it requires so much nourishment to support a double row that no vegetation will grow near

the trees. It is injurious to fruit trees to be too closely hemmed in with evergreens.

Fruit trees require a certain amount of wind to purify the air, and drive away the moths and other insects which are also more likely to collect in closely confined grounds.

A single row planted not too closely will make a more healthy and more graceful wind-break, and will not have the objection of preventing sufficient wind from passing through the orchard.

Single Row
Wind
Break.

Both the Yellow and White pine make desirable wind-breaks. The White cedar (*arbor vitae*) is also suitable.

Best Wind
Break.

In a country with long winters, and when the deciduous trees are without their foliage, it makes the home more attractive and comfortable if surrounded with evergreens. A few groups properly located in the grounds improve the scenery.

Groups of
Evergreens.

Slope the sides of hedges so that the bottom branches will get a share of the rains and dews. Cut the top even with the upper wire of fence, which should not be too high.

Slope
Hedges.

In a long hedge it is advisable to allow a tree to grow eighteen inches higher every fifty or sixty feet, and round the top. This improves the appearance by taking off the plainness. At each side of gates, leave a tree about thirty inches above the hedge, trimmed round, or any desirable shape.

Trimming
Evergreen
Hedges.

**Evergreens
for Hedges.**

Any of the evergreens are suitable for hedges. Both the Yellow and White pine make desirable line hedges on suitable soil, and where the winters are not too severe, the hemlock with its drooping branches, makes one of the most graceful hedges.

**Several
Evergreens.**

The White cedar is of slower growth, but makes the most compact hedge of any of the evergreens. All evergreen hedges should be grown close to a wire fence, so that the branches will grow through, and after being trimmed for several years outside the fence, the branches and wires will get so interwoven that after the posts decay, the wires will remain in place, and be stock proof, and at the same time a live and ornamental hedge, one which will live for fifty or more years. There are many deciduous shrubs that make beautiful hedges during the summer months, but on account of casting their leaves in the autumn, they add no beauty to a place when it is most needed. These also require the protection of a wire fence.

**Hedge for
Fifty
Years.****Deciduous
Shrubs for
Hedges.****Gracefully
Curved
Walks and
Drives.**

In laying out drives and walks, give them graceful curves whenever possible; avoid a straight walk from front door to the road. Before seeding a lawn, make sure that it has been cultivated sufficiently to destroy all weeds and weed seeds.

**Seeding
Lawn.**

The lawn can be seeded with success any time between early spring and the fifteenth of October. If sown after this date in Northern

Ontario the White clover will not stand the cold winter.

Sow the following mixture: Five pounds White clover, five pounds Red Top, and five pounds Kentucky Blue grass per acre, with one bushel of barley. Sow all broadcast on the

Lawn
Mixture.



55. BRUSH HARROW.

surface, after which give one stroke with the harrow or "Breed's Weeder." After the barley is up several inches, cut and leave it on the ground as a mulching. By keeping barley cut the lawn will very soon have an attractive appearance.

Barley with
Lawn Seed.

Sowing
Clover.
Brush
Harrowing
Lawn.

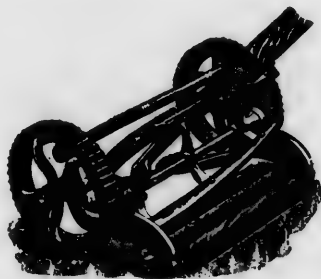
Each spring, sow a little White clover, and brush harrow (see Ill. 55) the lawn thoroughly to pulverize and smooth the surface, which is usually made uneven by earth worms. This is preferable to rolling.

Clover in
Lawn Seed.

Clover is of very great importance in a lawn to keep up the fertility, as it collects nitrogen to feed the other grasses, and keeps the lawn green during the summer.

Lawn
Requires
Little
Attention.

If the land has been thoroughly cleaned of weeds before seeding, it will require very little



56. LAWN MOWER.

Cutting the
Lawn.

attention in after years. The portion used for amusements in the summer evenings will require to be cut frequently with a lawn mower (see Ill. 56). The balance should be cut the beginning of June. This can be done with a horse mowing machine, but it is better not cut during the hot summer months.

Value of a
Lawn.

Groups of trees on the lawn give the place a park-like appearance, say one group in front near the road, and the other at the back. A

variety of evergreen and deciduous trees may be planted in these groups. One or two weeping elms are ornamental and agreeable during the summer months.

Grouping
Trees.

Groups of flowering shrubs on the lawn are very interesting. In order to get the best results it is advisable to dig around them.

Flowering
Shrubs.

In grouping trees, or shrubs, and in making flower beds, have no sharp angles, but round off the corners. This takes off the stiffness and gives a place a more easy and natural appearance.

Shape of
Groups.

In arranging groups do not plant three trees or shrubs in line. It is more natural to have them set irregular.

How to
Plant
Groups.

In making a selection of flowering shrubs, two things must be observed, viz.: select varieties sufficiently hardy for the locality in which they are required, and choose a collection that will bloom at various times, from early spring until autumn.

The following are a few varieties that have proved sufficiently hardy at the Ontario Agricultural College grounds, Guelph, where the thermometer occasionally reaches twenty to twenty-five degrees below zero: The rose-colored Weigelia (*Diervilla Desboisi*), the white-flowered Weigelia (*Diervilla Hortensis Nivea*), the large flowering Hydrangea (*Hydrangea Paniculata Grandiflora*), the Honeysuckle (*Lonicera Tartarica Grandiflora*), the Japan Quince (*Pyrus Japonica*), the Germander leaved Spirea (*Spirea*

Selection of
Hardy
Flowering
Shrubs.

Chamædrifolia), the Gudder rose-leaved *Spirea* (*Spirea Operlifolia*), the Purple Lilac (*Syringa Oblata*), the White Lilac (*Syringa Vulgaris Alba*), the Snowball (*Viburnum Nudum*).

The above list of shrubs will give satisfaction. There are many others which might be added for sheltered locations, such as the flowering Almond, etc., but which could only be grown with difficulty.

**Flower
Beds.**

The size and shape of flower beds will depend upon circumstances. A family who are fond of flowers will care for a larger and more varied collection than others whose tastes run in other lines. Two or three flower beds on the lawn are necessary for variety. These should be of various shapes, and, to get satisfactory results from them, a collection of autumn bulbs, especially tulips, should be planted in October or November, and covered with leaves or coarse stable manure. Snowdrops and crocus are the first to bloom in the spring, and should, therefore, be included in the collection.

**Bulbs for
Fall
Planting.**

**Covering
for Bulbs.**

Rake off the covering on the first signs of spring, and give those little beauties a chance to show their colors. Tulips are the most popular of all Holland bulbs for outdoor planting. Between the single and double varieties it is simply a matter of choice. Both make a magnificent display. A few Hyacinths in a flower bed, in addition to their beauty, add a pleasant odour. It is not necessary to continue

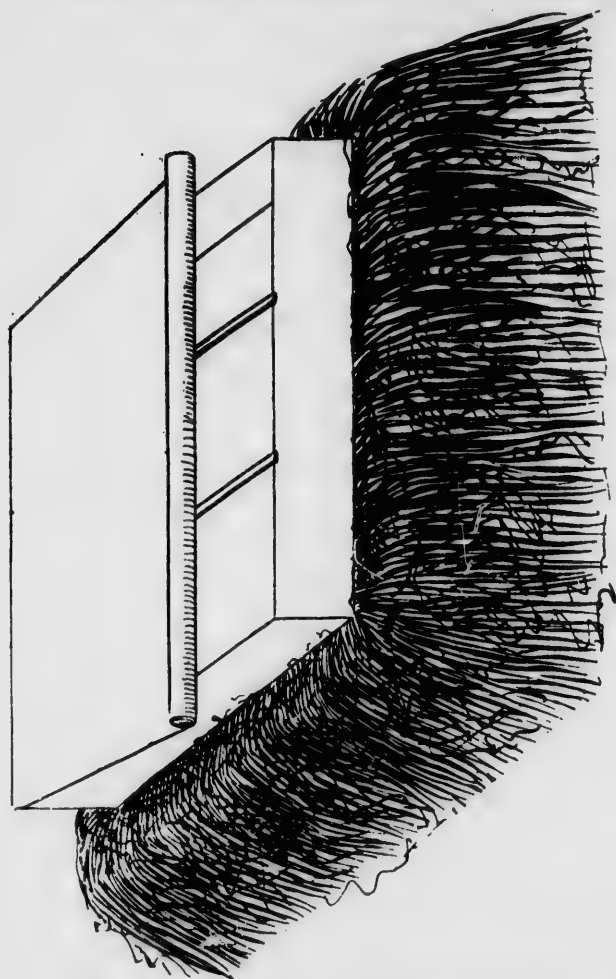
the list of bulbs suitable for outdoor planting. These can be procured by applying to any seedsman. Fall-planted bulbs will continue in bloom from early spring until the beginning of June, when the flower beds should be refilled with bedding out plants, which will continue to bloom until late in the fall.

Continuous
Bloom for
Flower
Beds.

It is not necessary for a farmer to buy either flower or vegetable plants, when he can buy the seed for a mere trifle, and, by making a hot bed, grow all the plants he will require at very little cost. (See Ill. 57). The situation for a hot bed should be dry underneath, be sheltered on the north and northwest by some kind of wind-break, and be fully exposed to the sun. It should be built up from two to two and a half feet high, and wider by one foot on each side than the frame which is to be placed on the heating material which forms the bed. This heating material should be fresh horse manure with the usual amount of litter. This is thrown into a pile, and in a few days, when fermentation has taken place, it is again turned over and carefully shaken out, and formed again into a pile, which is left until the second fermentation takes place. It may now be placed in position for the hot bed, shaped and trodden down so that it is uniform. Supposing the frame is made six feet by nine feet, twelve inches high at the back, and eight inches in front facing the south, the manure bed should be eight by eleven feet.

Hot Bed,
How to
Make.

Instead of covering the frame with glass, cotton is all that is necessary. It is much cheaper



57. HOT BED.

How to
Cover.

than glass and requires less attention. Get a cotton sheet made larger than the frame, so as to overlap a few inches. Have a roller made

about ten feet long, and the cotton tacked to it and to the upper side of the frame. This will hang over the ends and prevent the wind from moving the cotton. The cotton can be rolled up to air the plants when required. After the first intense heat has passed off, cover the manure over with about six inches of soil, which should be prepared the previous fall of rotted sod and cow manure. When the hot bed is completed, it is advisable to let it stand two or three days until the heat moderates before planting the seeds. The time to make a hot bed in Central Ontario is the beginning of April, so that the plants will be ready to set out by the first of June.

Roller
for Cotton
Cover.

Soil for
Hot Bed.

Bedding Out
Plants.

The selection of flower seeds best adapted for growing bedding out plants is a matter of fancy. As a rule those should be preferred that bloom from the time they are set out, say, the first of June, until late in autumn.

The following should be included in the list: Petunia, Phlox Drummondi, Verbena and Germanium. The latter can be grown in a hot bed from cuttings. For a full collection of flower seeds, see any of the seedsmen's catalogues.

Varieties
of Flowers.

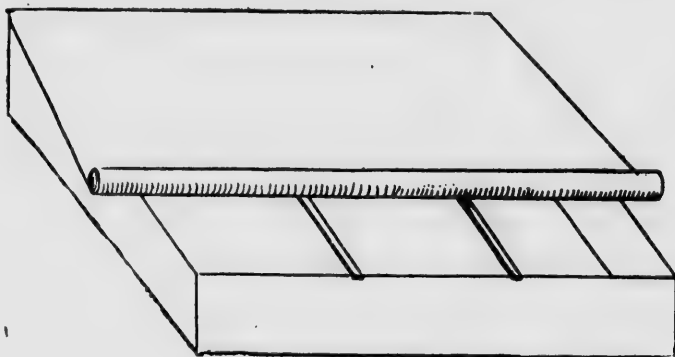
It is very desirable that a portion of the hot bed should be reserved for vegetable plants for early planting, say tomato, lettuce, cabbage, cauliflower, etc. Melons can be started in a hot bed by inverting sods in the soil and planting seeds in them. By leaving a few plants in the hot

Hot Bed for
Early
Vegetables.

bed at the close of the season, it will be both ornamental and useful during the summer.

Cold Frame.

In addition to a hot bed, every farmer should have a cold frame (see Ill. 58) to start vegetable plants early in the spring, such as cabbage, cauliflower, tomatoes and lettuce. A few plants of the latter may be started in the hot bed, and transplanted into the cold frame, where they will soon be ready for use. Early lettuce is relished by most people, and provision



58. COLD FRAME.

should be made by all farmers to have some ready for home use as early in spring as possible.

How to Construct.

The preparation of the soil should be done in the autumn, by digging in a quantity of well rotted farm manure, and covering a foot deep or more with coarse stable manure to prevent the soil from freezing, so that it can be planted early in the spring. Use the same frame as for a hot bed. When wanted for use remove the

How to Prepare Soil.

manure, and put the frame on the soil, using the same manure to bank the frame on the outside.

Cover the frame with cotton, provided with a roller the same as for the hot bed. It is necessary to have strips three feet apart, to prevent the cotton from sagging in the centre. Loosen up the soil with a spading fork before sowing seeds.

Covering.

Prevent
Covering
from
Sagging.

The cold frame must be sheltered from the west and north. By making due preparation, and sowing the seeds by the last of March, the plants will be ready to set out in the open ground by the end of May. These dates are for Central and Northern Ontario. For more southern latitudes, the time for sowing the seed and planting in the open ground, will vary according to situation.

Time to
Sow.

When more space is required to grow plants, it is not necessary to make separate frames, but enclose in one space, by setting short posts at back and front and nail eight-inch boards on the front and twelve-inch at the back. Closely board the ends and bank with either earth or manure. A cold frame of this description can be extended to any required capacity.

Large Cold
Frame.

In addition to a flower bed of annuals on the lawn, there should also be a bed of flowering perennials. These require very little attention. Make the bed of irregular shape, with rounded corners. Dig in considerable farm manure and mulch every winter. Plant such flowers as are

Flower Bed.

hardy and showy and that will bloom profusely in their season during the summer.

**Hardy
Perennial
Flowers.**

The following is a list of hardy perennials to select from. The common names only are given, and the colors are named.

Bleeding Heart, pink.

Coreopsis, yellow.

Dwarf Phlox, white, rose and crimson.

Gaillardia, red.

Garden Pinks, white, striped and rose.

German Iris, white, yellow and purple.

Helianthus, yellow.

Hollyhock, white, pink, yellow and crimson.

Japanese Iris, white, blue and crimson.

Larkspur, mixed colors.

Lemon Lily, yellow.

Lilium Candidum, white.

Oriental Poppy, scarlet.

Pæonies, white, rose and crimson colors.

Rudbeckia, yellow.

Sweet William, mixed colors.

**Cut
Flowers.**

The above list will provide a collection of bloom most of the summer, sufficient to brighten and make glad several homes with cut bloom, in addition to the outdoor ornamentation.

Rockery.

Another attraction on the lawn is a rockery in some shady corner, oval in shape, and raised in the centre with a few wheelbarrow fulls of rich mould. Spade in sufficient well rotted farm manure to prevent the soil getting hard, or forming a crust. When the bed is in shape and

raked, place five or six rustic stones on the bed, not in line or formal, but irregular. It is now ready for planting. The first thing to get is a collection of native ferns. This is an interesting work. Plant one root of each variety. There will be no difficulty in collecting fifteen or twenty distinct varieties in our woods or swamps. After the ferns are planted, put in a few perennial flowers, such as the Japanese and German Iris, Dwarf Phlox, Bleeding Heart and Garden Pinks.

How to
Construct.

Planting
Ferns and
Perennial
Flowers.

A rockery requires to be shaded, especially from the south and west. Frequently there is a shaded corner close to the house that is suitable for a rockery, one which will look cosy and requires little attention.

Location for
a Rockery.

A few hardy climbers around the house give a home-like and interesting appearance. A few plants of Ampelopsis Veitchii (Boston Ivy,) planted so that they can get hold of the wall will cover an ordinary house in a few years. It requires no support other than the wall to which it will cling, be it stone, brick or wood, and although it does not bloom, it is very attractive.

Hardy
Climbers.

Boston Ivy.

Clematis Jackmanii, has a large dark purple flower, and the Clematis Paniculata a small white fragrant flower. These are both hardy climbers.

Clematis.

No home would be complete without a variety of Roses. For hardy climbers, the two well-known varieties, "Baltimore Belle," blush

Climbing
Roses.

color, and "Prairie Queen," rose color, still hold their own.

**Summer
Flowering
Bulbs.**

A border of summer flowering bulbs dividing the lawn from the vegetable garden is quite attractive, and as the bulbs multiply each year, the principal cost is in the commencement.

**Varieties
For Border.**

For the first row next the lawn, I would suggest *Gladiolus*, the flowers of which are of various colors and charming appearance.

Second row, *Cannas*, Crozy's Dwarf sorts.

Third row, *Dahlias*, mixed colors.

**Horse
Cultivation.**

The rows should be thirty inches apart so that the cultivating can be done with a horse. The bulbs require to be taken up in the autumn and kept in a cool cellar where they will not freeze. Should there be any danger of frost, sprinkle a little sand or mould over them in the early part of the winter.

**Rose, Queen
of Flowers.**

This subject would not be complete without mentioning the queen of flowers, the Rose. In order to complete the floral department, plant a row of hardy Roses, four feet from the row of *Dahlias* so that the cultivating can be done with a horse. There are such a large variety of roses that I will only name the following varieties as being suitable for outdoor blooming, and refer the reader to the nurserymen's and seedsmen's catalogues for a larger collection.

**Collection
of Roses.**

Coquette des Blanches, white; *General Jacqueminot*, scarlet; *Paul Neyron*, pink; *Persian*, yellow.

SECTION II.

VEGETABLE GARDEN.

The vegetable garden should be looked on as one of the important departments of the farm. A succession of fresh vegetables from early spring until winter is necessary for the health of all classes in this country. It is a wise provision of nature that the food we should eat can be grown in the climate in which we live. In the tropical climates we find the people living almost entirely on fruits and vegetables. Were they to eat fatty foods they could not long live, as such a diet would encourage disease. In our temperate zone, where we have both heat and cold, we should govern ourselves accordingly, and so arrange that our diet during the summer season be composed largely of fruits and vegetables. According to analysis from eighty to ninety per cent. of fruits and vegetables is water. The same holds good for grass. We know that our animals never thrive better than in spring, on fresh grass without any additional food. The lesson we deduce from this is that a vegetable food in summer is what we require, but for an outdoor life in winter we require a more concentrated and heating food. In the Arctic regions the food of the natives is principally the fat of whales and other sea animals, called "blubber." This is necessary to supply heat for the body.

Value of
Vegetable
Food.

Diet
According
to Climate.

**Underdrain-
ing Garden.**

The first consideration in selecting a location for the vegetable garden is to have a dry subsoil. If it is not naturally so it should be thoroughly underdrained. In clay soil the drains should not be more than thirty feet apart.

**Manuring
Garden.**

Spread on the surface well rotted farm manure, about twenty-five tons per acre. Plow this under not more than four inches deep. After being thoroughly harrowed and cultivated, so that the manure and surface soil are thoroughly incorporated, break up the subsoil with a subsoil plow, or cultivator with chisel pointed teeth, as illustrated on page 26. It is preferable to have all this work done in the Autumn, and have the ground ribbed so that there is nothing required in the spring except to harrow and cultivate.

**List of
Vegetables.**

The following is a list of vegetables suitable for a private garden. The directions for cultivation are suggestive.

Asparagus.

Asparagus is one of the very earliest vegetables in the spring. It is a perennial and can be grown from seed sown in the spring. Plant in rows thirty inches apart, the plants left nine inches apart in the row, or plant in a bed two feet between the rows, and nine inches in the row, for hand cultivation. For best results, the land must be thoroughly enriched with well rotted manure in the fall. As it is a gross feeder, apply a good sprinkling of salt in the

**Planting
Asparagus.**

spring. A good variety of asparagus is the "Palmetto." The roots can be purchased from any seedsman.

Variety of
Asparagus.

Beans, dwarf or bush. This vegetable being a "*Legume*" is known to be of the most nutritious and best as a flesh forming food.

Beans
Nutritious
Food.

A succession of sowings should be made from early spring until the middle of summer. Plant in drills two feet apart, and the seeds three inches in the drills, and about two inches deep. The rule governing the depth of all seeds is from four to five times their diameter.

Depth to
Plant
Seeds.



59. THE DIBBLER.

Two varieties suitable to sow are the "Valentine," having green pods and the "Kidney Wax," which has a yellow pod.

Beans
Variety.

For early use sow beets in the spring, as soon as the ground is fit to work, in drills two feet apart, and thin the plants to six inches apart in the drills.

Beets.

For winter use it is advisable to sow in June, as this will give a more crisp and superior quality.

When to
Sow Beet
Seed.

By using a dibbler (see Ill. 59) beets and, in fact, most seeds and plants, both flower and

Dibbling
Seeds and
Plants.

vegetable, can be grown at the desired distance apart without any variation. This gives a garden an attractive appearance. For those who grow vegetables on a larger scale a "Hill" dropping seed drill is preferable. (See Ill. 60).

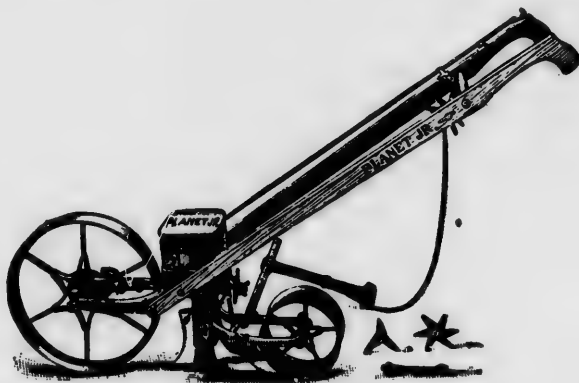
Hill Seed Drill.

Variety of Beets.

Popular varieties of beets are Crosby's Egyptian, and the Eclipse.

Cabbage.

There can be no mistake in growing a large quantity of cabbage, for should there be more



60. HILL DROPPING SEED DRILL.

than is required for home use, the balance can be fed, at a profit, to the animals. The plants are taken from the cold frame, as soon as all danger of frost is past, and planted in the vegetable garden.

How to Plant Cabbage.

Plant in rows two feet apart, with the plants eighteen inches apart in the rows.

Varieties of Cabbage.

For the early variety "Winningstadt" answers well, and for a late variety "Fottler's Drumhead."

Cauliflower is a plant that requires abundance of moisture in order to get the best results. It would stand a shower bath every evening when near the time for heading, but as this is seldom practicable the next best thing is to cultivate the soil every few days, so as to conserve moisture

**Cauliflower
Requires
Moisture.**

As soon as the heads begin to show, break down the top leaves, which prevents the heads from getting discolored.

**Keep
Cauliflower
Heads
White.**

Among the reliable varieties are "Earliest Erfurt" and "Snowball."

**Cauliflower
Varieties.**

Carrot cultivation is similar to that of beets, excepting that the distance the plants are apart in the row should be four inches instead of six.

**Carrot
Cultivation.**

Oxheart and Chantenay are two satisfactory varieties for table use.

**Varieties of
Carrots.**

Celery requires a cool, moist atmosphere, and a rich, black muck is especially adapted for this plant. The seeds should be sown in a cold frame, or in the open ground, early in the spring. Celery, cabbage and cauliflower plants are made more stocky by shearing off the tops once or twice before transplanting. The best results are obtained by transplanting from the frame into plant boxes, six in each, then transplanting in July in rows three feet apart, and six inches in the row. It is not necessary to plant celery in trenches. When transplanting firm the soil with the feet to insure a start. In

**Celery
Requires
Moisture.**

**Celery
Plants.**

**Trans-
planting
Celery.**

four or five weeks begin to earth up, to teach the plants an "upright" life.

**Blanching
Celery.**

For blanching or whitening, first use a hoe, drawing up the leaves with one hand, and packing the earth around the plants with the other. Subsequent banking up can be done with the horse and plow. To prevent the earth getting among the stalks lap binder twine once around each plant. The last banking should be done ten or fifteen days before it is required for use or to be stored.

**Storing
Celery.**

In storing for winter use, dig up before the time of hard frosts, and take immediately to a cool cellar and set on the floor, with boards at the sides. Bank up with sand or earth, the same as for blanching in the field.

**Celery
for Poultry.**

Celery is now being fed to poultry in the feeding process for table use. It imparts a delightful flavor to the flesh.

**Varieties of
Celery.**

Varieties for table use: "White Plume" and "Paris Golden."

Sweet Corn.

No garden would be complete without a supply of sweet corn for table use. Plant corn after all danger of frost is past, either in hills three and a half feet each way or in rows four feet apart, and eight inches in the row. Corn requires continuous cultivation during the growing season to conserve moisture.

**Planting
Corn.**

**Varieties of
Corn.**

Varieties: "White Cory" and "Stowell's Evergreen."

Cucumber plants for early use can be started in the hot bed and set in the open ground as soon as all danger of frost is past. At the same time, the general crop may be planted by putting a few seeds in hills four feet apart. Pick the fruit whether it is required for use or not, otherwise the vines will die off.

Cucumber
Planting.

Varieties for table use and for pickling: "Long Green" and "White Spine."

Cucumbers
For Table
and
Pickling.

Lettuce may be sown early in the spring in rows two feet apart. Thin out for table use, or for the poultry, and allow a certain number to heart. If sown every three weeks, fresh lettuce may be had during the summer season.

Cultivation
of Lettuce.

"Simpson's Curled" and "Nonpareil," are good varieties.

Varieties of
Lettuce.

Musk melons are greatly relished by most people, and should be cultivated in every garden. A light warm soil is preferable, one made rich with well rotted farm manure. The cultivation necessary is the same as for cucumbers.

Melon Musk
Cultivation.

Musk melons and cucumbers should be kept some distance apart, otherwise they are liable to become inoculated. A reliable variety is the "Hackensack."

Melon Musk
Varieties.

The cultivation of the water melon is exactly the same as for musk melons. A delicious variety is the "Ice Cream."

Melon
Water
Variety.

The citron well known for preserving should be in every garden. It requires to be grown

Citron for
Preserving.

some distance from the water melons. Give the same cultivation as for melons. The "Red Seeded," is a suitable variety.

**Cultivation
of Onions.**

Onion seed may be sown quite early in the spring, as a few degrees of frost will not injure the young plants. Sow (thin) in rows fifteen inches apart.

**Onions from
Seed.**

After the bulbs are about half an inch in diameter all that are not required for use when thinning may be left on the ground to dry off. These can be kept over winter and planted for early use in the spring.

**Onions from
Sets.**

**Varieties of
Onions.**

Varieties: "Yellow Globe Danvers," "Red Wethersfield" and the "Silver Skin" for pickling.

**Paranip
Cultivation.**

The paranip is one of our most nutritious vegetables. Sow the seed early in the spring in rows, two feet apart, and thin to six inches in the rows. Leave them in the ground, until early winter, as they are improved by the early frost.

**Paranip
Variety.**

A good variety is the "Hollow Crown."

**Peas for
Daily Food.**

Peas being one of the *legumes* should form a portion of our daily diet. Sow early in the spring in rows two feet apart. Cultivate thoroughly. Make two or three sowings at intervals of three or four weeks. Varieties suitable are "Extra Early" (for first sowing) followed by "Little Gem" and "Stratagem." The last two are large, green, wrinkled varieties.

Varieties.

All the pumpkins required for table use may

be grown along with the corn. The "Large Cheese" is a good variety. Pumpkins
Variety.

Radish must be grown quickly in order to be crisp. Sow at intervals from early spring until autumn. To hasten vegetation, harrow in land plaster before sowing. Sow in rows two feet apart. Radish
Cultivation.

Varieties are "Scarlet Turnip" (white tip) and "Long Chartier." Varieties
Radish.

Rhubarb seed may be sown in spring in drills two feet apart, and thinned to same distance, or it may be grown more satisfactory by dividing the roots. For this plant the soil cannot be too rich. Mulch in winter. "Johnston's St. Martin" is a good variety. Rhubarb
from Seed
and Roots.

The squash as a vegetable is increasing in popularity. The cultivation is similar to melons, excepting that the hills should be eight feet apart. Squash
Cultivation.

For summer use sow the "Vegetable Marrow," and for winter use the "Hubbard." Squash
Varieties.

The tomato plants are supposed to be started in the hot bed or cold frame. For best results transplant into quart berry boxes, one plant in each, and when all danger of frost is past transplant (on a cloudy day if possible) three feet apart each way. Reliable varieties are the "Early Atlantic or Ruby" and "Livingston's Perfection." Tomato
Cultivation.

For early turnips sow in spring, in drills two feet apart, and thin to eight inches. For Turnip
Cultivation.

**Turnip
Varieties.**

an early variety would name "Early White Globe." For winter use sow a "Bronze Top Swede" about first of July.

**Potato
Culture for
Early
Market.**

In the cultivation of potatoes for the early market, the largest profit is from the very earliest so that there has become quite a strife among gardeners to be first. In order to gain this the soil, if not naturally dry and warm, must be made so by underdraining. In the Autumn give a good coat of farm manure, and incorporate it with the surface soil. Then put up in narrow ribs for the winter. In spring harrow and cultivate these down, and sow broadcast over the surface lime at the rate of about five hundred pounds per acre. Then cultivate and harrow thoroughly, and the ground is now ready for planting: Open the drills with a plow, four inches deep and thirty inches apart. Plant whole potatoes of medium size, eighteen inches apart in the row. Cover with the plow, and in eight days harrow down. Keep the surface pulverized with a "Breed Weeder."

**Potato
Planting.**

Cultivate frequently while the potatoes are growing to conserve moisture. The last time the earth may be thrown towards the potatoes to cover any that may be exposed to the sun. Do not hill up potatoes.

**Potato
Propagating**

Two weeks before planting spread the seed potatoes on the floor in a warm room, where there is plenty of sunlight, so that the hardy

sprouts will start. These should not be injured. This method will ensure an early crop. Among the innumerable number of early varieties two old sorts are worthy of mention as these are still among the first: the "Early Ohio" and the "Early Market."

Early
Potatoes
Varieties.

In gardening follow a rotation so far as practical. After the early potatoes are harvested, sow peas and buckwheat to plow under. This will add fertility, in addition to improving the texture of the soil.

Rotation in
Garden.

SECTION III.

SMALL FRUITS.

The same preparation of the land necessary for vegetables is required for small fruits.

The first of these to ripen is the wholesome and appetizing strawberry. These should be grown in every garden. The surplus can always be disposed of at remunerative prices.

Straw-
berries.

The plants can be set out at any time from early spring until October, in thoroughly prepared soil. Set in rows three feet apart, and eighteen inches in the row. Cultivate frequently the first season, and destroy all weeds. Renew by setting out one-third of the whole in new plants every year.

Planting
Straw-
berries.

An equal portion of the old stock may be plowed under and used for some other crop. This rotation will give superior fruit. Mulch

Renewing
Straw-
berries.

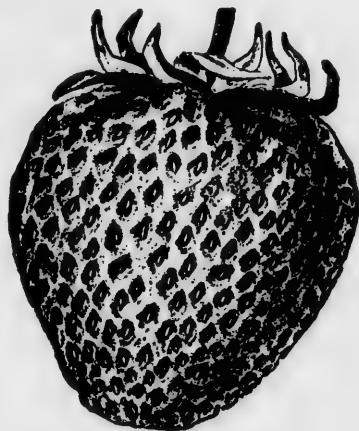
Mulching
Straw-
berries.

late in the fall with coarse farm manure. Uncover the crown of plants early in spring, and leave the manure for mulching.

The varieties are so numerous that it is difficult to make a selection.

Clyde
Strawberry.

The "Clyde" is regarded as one of the best all round varieties at the present time, having a perfect flower. Ripens early; fruit firm and large. (See Ill. 61).



61. STRAWBERRY—CLYDE.

Goose-
berries.

Varieties of
Goose-
berries.

While gooseberries do not grow to the same perfection in this country that they do in Great Britain, yet the following varieties give, as a rule, very good results: "Downing" (green in color) (see Ill. 62); "Whitesmith," yellowish white and smooth (see Ill. 63); "Industry," dark red, hairy (see Ill. 64). Plant gooseberries in rows four feet apart each way. Train the bushes in the form of a tree.

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62. GOOSEBERRY—DOWNING.



63. GOOSEBERRY—WHITESMITH.

In the cultivation of fruits of all kinds, there should be an abundant supply of vegetable matter incorporated with the surface soil to supply plant food and act as a mulching to conserve moisture. The cultivating should be

Cultivation
for Fruits.



64. GOOSEBERRY—INDUSTRY.

done during the spring months. In July, sow Red clover between the rows of bushes, and sometime during the following spring, spread between the rows some rotted farm manure, and plow under lightly, then harrow and cultivate according to the previous directions.



65. CURRANT—FAYS' PROLIFIC (RED).

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66. CURRANT—BLACK CHAMPION.

No farm home would be complete without a supply of currant jelly. The planting and cultivation of currants is similar to that of gooseberries except that currants may be grown in bushes instead of a single stalk. By this means, the wood can be renewed by cutting out

Red
Currants.



67. RASPBERRY—MARLBORO.



68. RASPBERRY—CUTHBERT.

the old stalks. As a suitable Red currant we would suggest the old reliable "Fays' Prolific" (see Ill. 65), and for a black variety the "Black

Black
Currants.

Champion" (see Ill. 66).
Raspberries come immediately after the strawberry season, and give abundance of



69. RASPBERRY—GOLDEN QUEEN.



70. BLACK CAP BERRY—HILBORN.

**Planting
Rasp-
berries.**

delicious fruit at little cost. Plant and cultivate according to directions given for other small fruits. Cut out all the old wood and weak shoots each spring, leaving not more than six stalks for fruiting. No suckers should be allowed to grow outside the hills. From the long list of red varieties the following might be named: "Marlboro'" for earliest (see Ill. 67), and "Cuthbert" (see Ill. 68) to follow. For a yellow variety "Golden Queen" (see Ill. 69).

**Pruning
Rasp-
berries.****Variety of
Rasp-
berries.****Black Cap
Berries.****Black-
berries
(Brambles).****Varieties of
Black-
berries.****Grapes.****How to
Plant
Grapes.**

For black cap berries, there will be no mistake in selecting either the "Hilborn" (see Ill. 70), or the "Gregg" (see Ill. 71). Black-berries (brambles) are generally relished on account of their peculiar aromatic flavor. The cultivation is the same as for raspberries, except that the rows should be seven feet apart, and the plants four feet apart in the row.

In selecting a variety, there can be no mistake in choosing either the "Snyder" (see Ill. 72), or a newer variety that is claiming first place, the "Wilson Junior" (see Ill. 73).

If one fruit is more highly esteemed than another, it is the grape. Besides its delicious fruit, the vines can be trained on a trellis or an arbor, so as to be both ornamental and useful. To ensure success, the cultivation and pruning must receive proper attention.

Set out in the spring, selecting good, strong vines. The soil must have been thoroughly



71. BLACK CAP BERRY—GREGG.



72. BLACKBERRY—SNYDER.



73. BLACKBERRY—WILSON JUNIOR.

cultivated. Plant in rows eight feet apart, and about sixteen feet in the row. Allow grape vines to grow the first summer without pruning. In the fall prune back, leaving three or four buds at the bottom. The following spring allow only two of these shoots to grow, and in the fall cut them back to about four feet. The following spring these two shoots may be fastened horizontally to the lower wire of the trellis. (See Ill. 74).

How to
Prune
Grapes.



74. GRAPE TRELLIS.

The uprights should be from ten to twelve inches apart. In the fall the upright shoots should be cut back to two or three buds, and only one of these allowed to grow in the spring. In tying up grape vines use some soft material, as tow or roffea.

How to
Train
Grapes.

The cultivation of grapes should be thorough, and only in the spring and early summer. At the end of July some crop should be sown, and allowed to remain on the surface as a mulching until the following spring. A suitable crop for this purpose is vetches and buckwheat (mixed).

Cultivation
of Grapes.

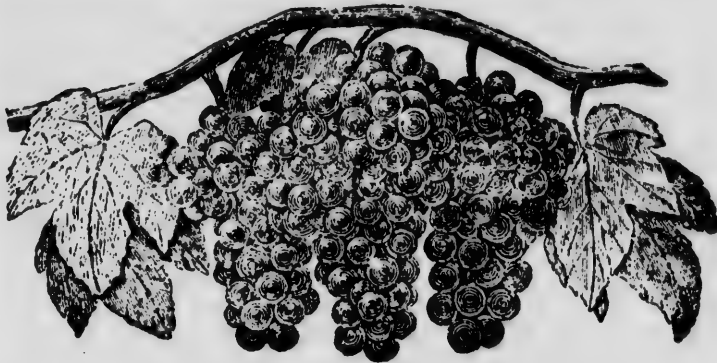
Mulching
Grapes.

The advantage of this method is that the crop will use a large portion of the moisture (of the soil) during the months of August and September. This will allow the wood and fruit to mature earlier and in its proper season. This mulching also prevents the frost from injuring the roots in winter, and keeps the grapes from starting to grow too early in the spring.

Ripening
Grapes.

By plowing this under, along with well rotted farm manure, in the spring, and culti-

Fertilizing
Grapes.



75. GRAPE—CAMPBELL'S EARLY (BLACK).

vating as in the previous year, you will insure an abundance of matured fruit.

During the past few years many new varieties of grapes have been introduced, and after a trial have been found wanting. The following varieties can be relied upon: "Campbell's Early" (see Ill. 75) and the "Concord" (black color), the "Brighton" (see Ill. 76) and "Moyer" (red), and "Moore's Diamond" (see Ill. 77) and "Niagara" (white).

Varieties of
Grapes.



76. GRAPE—BRIGHTON (RED).



77. GRAPE—MOORE'S DIAMOND (WHITE).

SECTION IV.

ORCHARD.

**Exposure
for Orchard.**

It is considered that the most suitable location for an orchard is a north-east by east exposure, for the reason that the trees thus exposed are later in blooming, and consequently there is less danger of frost destroying the fruit when it is forming. This, however, can in a measure be obviated by mulching in the autumn.

**Draining an
Orchard.**

Before planting an orchard the land should be put in proper condition by first under-draining, the drains placed thirty-five feet apart, and arranged so that there will be a drain between the rows of trees. If close to the trees the drains are liable to be choked with the rootlets. A clover sod plowed and manured in the fall the same as for root crop (see cultivation for field roots) is the most desirable preparation of the soil for planting an orchard.

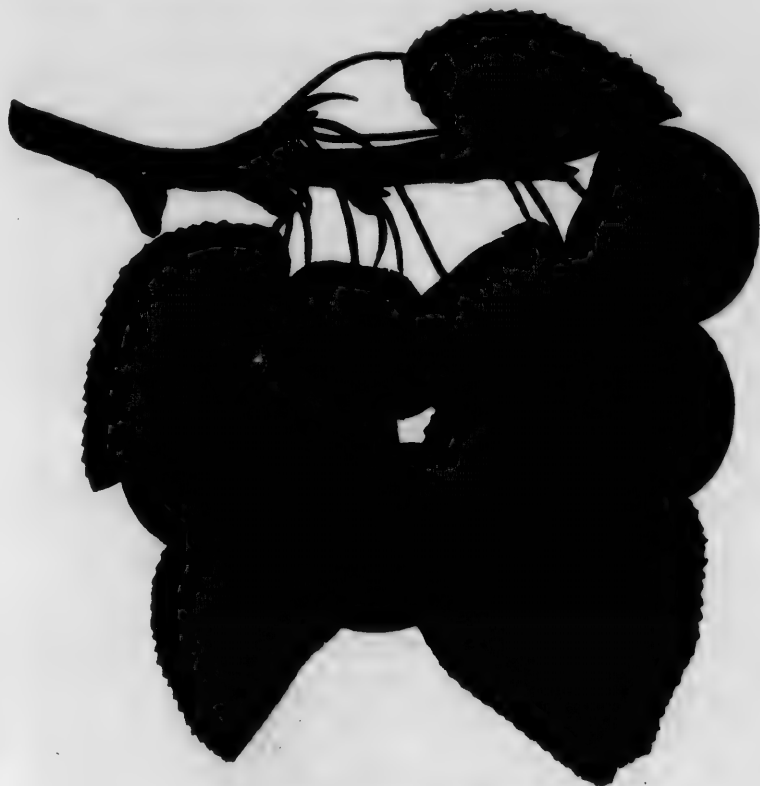
**Planting an
Orchard.**

The early spring is the proper time to plant all fruit trees. Plant an orchard in rows thirty-five feet apart, and thirty-five feet in the row. Set alternately so as to allow more space for the trees.

Pears, plums and cherry trees would do twenty feet space, but when only a few of each of these are required for home use it is advisable, for convenience in cultivating, to keep them in line with the apple orchard.

In planting make the holes large enough to admit the roots without cramping or bending, and deep enough to bring the tree to its natural depth. The fine surface soil should be used for

How to
Plant Trees.

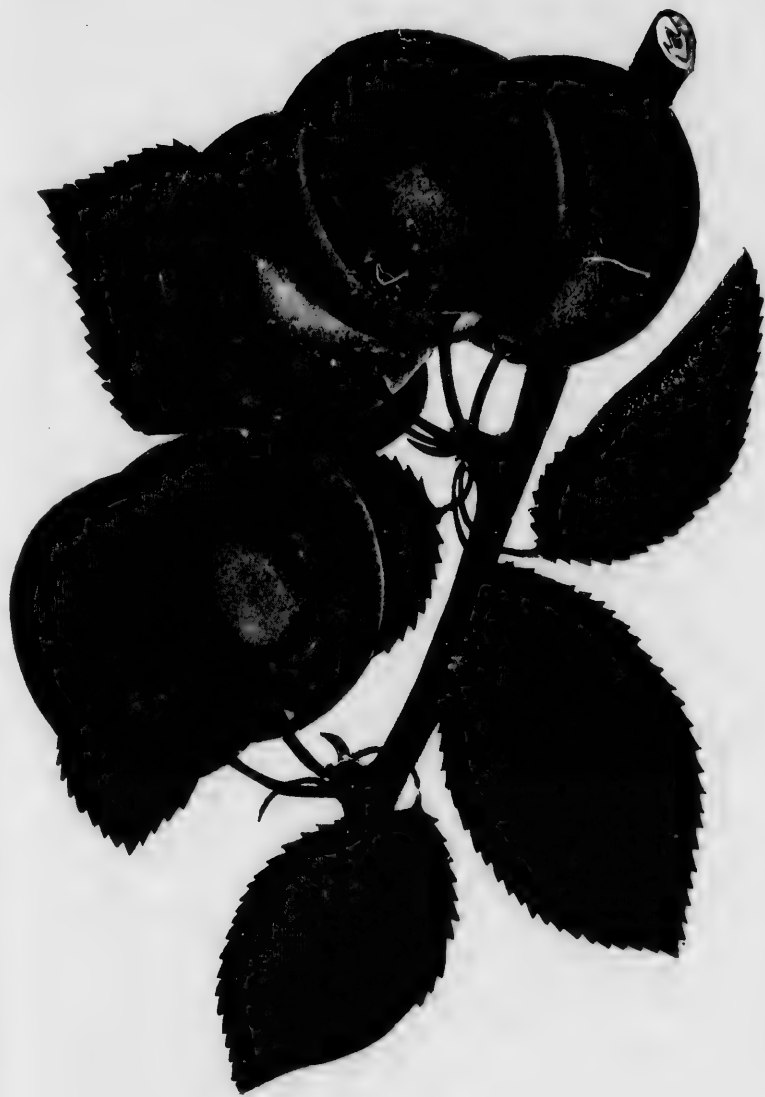


78. CHERRY—LOUIS PHILLIPPE.

covering the roots, and this should be carefully worked among them. If the ground is dry, it is well to pour in some water when the hole is partially filled. See that the ground is firmly



79. CHERRY—BLACK TARTARIAN.



80. PLUM—NIAGARA.

packed over all parts of the roots by exerting the full weight of the planter upon it, so that there will be no opportunity for dry air to enter and destroy the roots. Fill the holes full enough to be even with the surrounding surface after the fresh earth settles. Never put manure in contact with the roots. The young trees should be staked and tied so that the wind will not loosen the roots.

**Mulching
Trees.**

When the trees are planted, they should be mulched with coarse farm manure four or five inches deep, for a space of two feet more in diameter than the extent of the roots. This keeps the earth moist and of even temperature.

**Cultivating
an Orchard.**

The following spring the ground should be cultivated around each tree for a space of at least two feet outside the roots. Repeat the cultivating frequently during the summer. Again mulch in the autumn. A hoe crop may be grown the first season after planting between the rows of trees, followed with a grain crop the second year, seeding with Red clover. After an orchard commences to bear fruit, which should be in three or four years, no other crop should be taken off the land. The after cultivation should be as follows: Plow shallow early in the spring, then harrow and cultivate alternately during the early summer, using wide points on the spring tooth cultivator to cut off all thistles and weeds, and thus thoroughly clean the land.

**Cropping
Between
Trees.**



81. PLUM—DUANE'S PURPLE.

**Cover Crop
for Orchard.**

In July or August sow some crop to remain on the land during the winter as a cover crop. This has the same beneficial effect as for grapes. It absorbs a portion of the moisture, so that the fruit will be ripened in better condition to

**Advantages
of Cover
Crop.**

prevent rot, and the wood also matures earlier, so that it will the better stand the winter frost. The covering also prevents the roots from being injured by the frost. The cover crop should consist largely of some *legume*, such as clover, peas or vetches. A good mixture would be

**What to
Sow in
Orchard.**

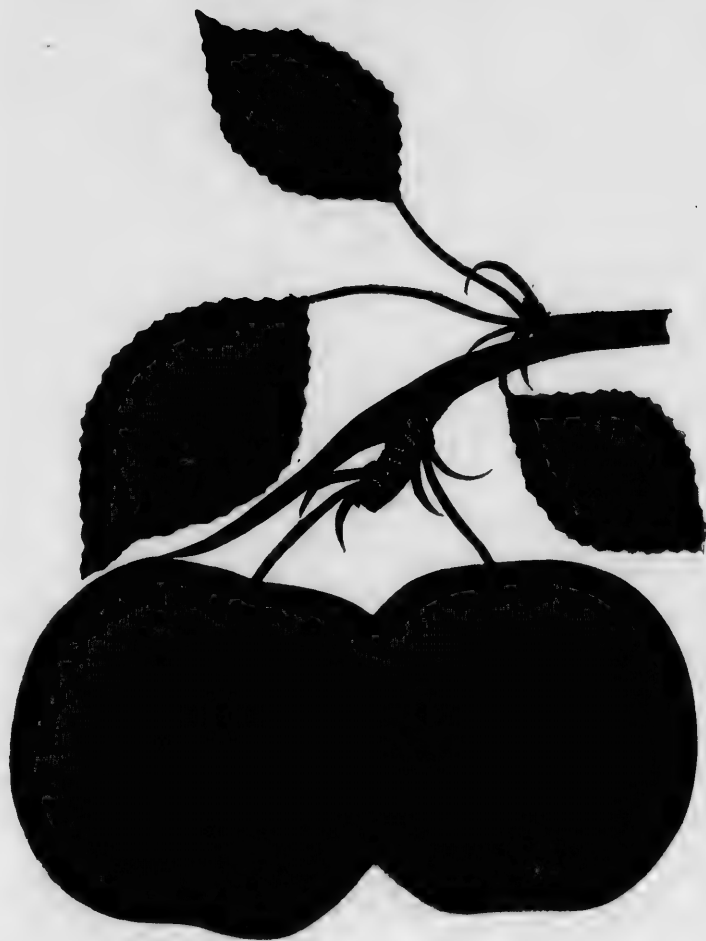
(mixed), and drilled in, and at the same time sow eight pounds of Red clover seed in front of the drill spouts. After drilling, give one stroke with the harrows to smooth the surface. In winter spread farm manure in the rows of trees about twelve feet wide, and plow under (shallow) with the cover crop. Then harrow and cultivate as

**Cultivation
of Cover
Crop.**

before. The eighteen feet of clover between the rows of trees may be cut for hay the first year, and plowed the following spring along with the balance. After the orchard is in full bearing it is an advantage to allow the clover to grow over the entire surface for a year occasionally, and remain over winter for a mulching. The advantages are that it will

**Advantages
of Clover in
Orchard.**

collect a large amount of free nitrogen from the air. The roots will go down two or three feet and bring up a large amount of soluble mineral matter. Besides they perforate the soil among



82. PLUM—REINE CLAUDE.

the roots of the trees and let in the air, which is very essential. A cover crop of clover, vetches or farm manure also prevents the trees from blooming too early in the spring. Although the above directions are especially applicable to

**Cherry
Varieties.**

the apple orchard, they are equally beneficial for other fruit trees. Following in the order, according to diagram on page 32, the cherries will come in order next to the grapes. Standard trees are more suitable than dwarfs for horse cultivation. Reliable varieties of acid cherries for preserving are "Montmorency," a red, and "Louis Phillipe," also a red. (See Ill. 78). The following are three satisfactory varieties of sweet cherries for table use: "Governor Wood," a pink, "Elton," a yellow blush, and the "Black Tartarian." (See Ill. 79).

**Cherries for
Preserving.****Cherries for
Table Use.****Plum
Culture.**

This most delicious of fruits, the plum, has suffered severely in past years from the "Curculio" and "black knot," but now that we are able to combat against these and other pests, by spraying with certain compounds which will be given later in apple culture, the plum should be grown.

**Plum
Varieties.**

For an early plum the "Niagara" (see Ill. 80) might be named. This is a seedling from the "Bradshaw." Its color is dark blue. For second, the early "Duane's Purple" is a favorite (see Ill. 81), and for an autumn variety the "Reine Claude," a greenish plum marked with red. (See Ill. 82).

Peaches.

Hardy peaches for Central and Northern Ontario are yet in the experimental stage, and, no doubt, this desirable object will be obtained within the next few years. A Mr. Breckon already claims to have a new seedling which



83. PEAR—CLAPP'S FAVORITE.

will grow in more northern latitudes than our present varieties.

**Pear
Culture.**

The cultivation of the pear is extending as its value is appreciated. The melting, juicy texture, the fine flavor and delicate aroma of the pear give it a high place among fruits.

**Pears,
their Value.**

A pear orchard, properly attended to, will yield larger returns than an apple orchard, but pears require special care, particularly in picking and packing, both for home use and for shipping.

**Pear
Varieties.**

Two reliable summer varieties are the "Bartlett" and "Clapp's Favorite." (See Ill. 83). For the autumn "Sheldon" and "Flemish Beauty" (see Ill. 84) are suitable, and for early winter "Beurre D' Anjou" and "Beurre Clairgeau." (See Ill. 85).

**Apple
Orchard.**

The apple orchard should be divided into two departments; the first for domestic use, and the second for export purposes. For home use, in ordinary cases, two or three trees of each of the following varieties will be sufficient for summer and early winter use.

**Varieties
for Domestic
Use.**

**Apples for
Export.**

One of our best and earliest varieties is the "Yellow Transparent" (See Ill. 86). This is a Russian variety which was imported in 1870 by the Agricultural Department. Then follow the "Duchess of Oldenburg," "Stibbard's Seedling," "Snow" or "Famuse," and "Wealthy." The balance may be reserved from the winter varieties grown for export.



84. PEAR—FLEMISH BEAUTY.

This export trade is bound to increase as this country is specially adapted to apple culture. Our farmers should, therefore, take advantage of their opportunity, and be prepared, each for his portion of this trade. My idea is that the farmer's part of the business is to grow the apples, and sell them outright to the shippers in the autumn, so that he can attend to his other farm work and let the shippers see after the picking, packing, etc. Many farmers who have orchards in full bearing and of a suitable variety for export, are deriving handsome returns.

Sell on the Tree.

In planting out an orchard, first decide on the variety you intend to grow for the export trade, and see that you get good, healthy young trees. For export it is necessary to have a good winter variety; one of the best is the "King of Tompkins" (see Ill. 87). It is a good shipper and commands a high price in the British market, but it is a scant bearer, unless grafted on healthy growing stock, such as "Talman Sweet," than which none is better. By doing so the yield will be increased double. This is done by planting out an orchard of "Talman Sweet" trees, and the second year grafting "Kings" on half of the top.

Plant Healthy Trees.

Grafting on Talman Sweet.

How to Graft.

If there are four or five main branches to form the top, graft each alternate branch about three inches from the trunk and horizontal, to form the top properly, and the balance the fol-



85. PEAR—BEURRE CLAIRGEAU.

lowing year. Do not cut off the whole top in one year. These trees will commence to bear in three or four years after grafting. Satisfactory results are obtained from grafting "Kings" on the "Wealthy," "Duchess" and "Ben Davis" (see Ill. 88). The latter is one of the most prolific and best shipping apples, but the quality is inferior. As a long keeper it has no superior, if equal. There are many orchards being planted with this variety, and should the market get overstocked, either "Kings" or "Northern Spy" (see Ill. 89) can be grafted on the "Ben Davis" trees. The "Northern Spy" will bear in four or five years, whereas on their own stock they will not bear for fourteen or fifteen years from time of planting.

**Advantage
of Grafting.**

**Apples for
Export.**

**Graft
Northern
Spy.**

**Varieties
Without
Grafting.**

Any of the following varieties will give satisfaction for export, without grafting, viz., "Ontario," "Sutton Beauty" (see Ill. 90) and "Baldwin."

**Pruning
Fruit
Trees.**

Pruning fruit trees is an important matter. The time to begin is before the tree is planted, when the branches should be cut back and the top formed. Pruning should be done as the leaves are opening, end of May or first of June. When this work is attended to annually and properly, there will rarely be any large limbs to cut off.

**Shape of
Tree Top.**

The ideal shape is an inverted umbrella, so that the sun and air may reach all the branches.



86. APPLE—YELLOW TRANSPARENT.

No two cross branches should overlap each other.

The last but not the least important work in connection with fruit culture is protecting the trees and fruit against insect pests. With

Spraying
Fruit Trees.



87. APPLE—KING OF TOMPKINS.



88. APPLE—BEN DAVIS.

**Selecting
Spraying
Apparatus.**

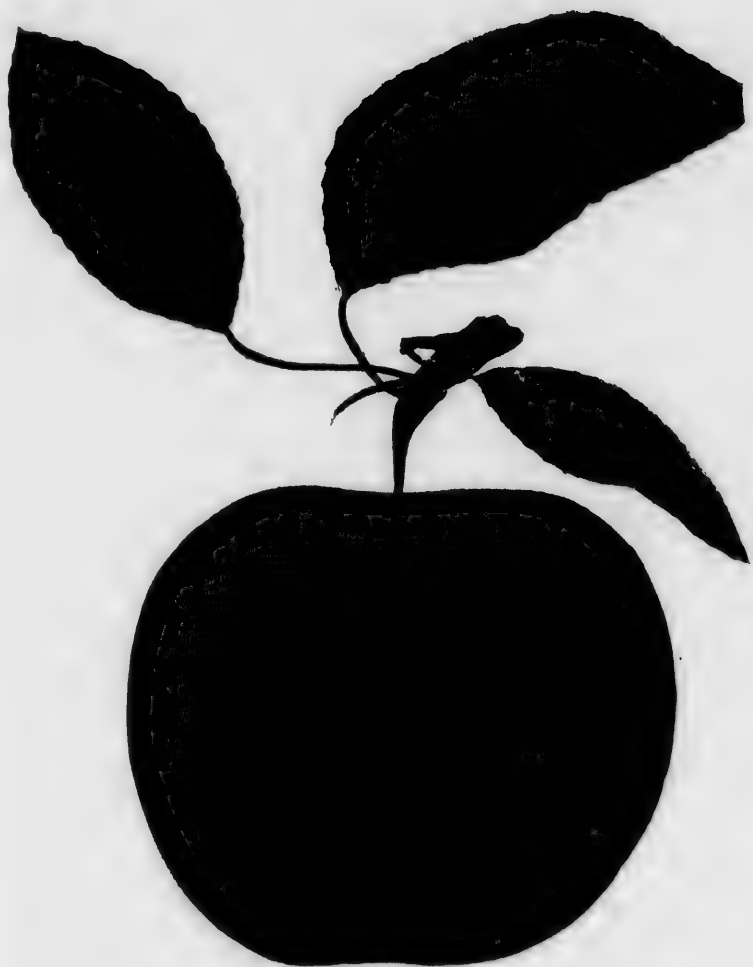
the proper utensils and materials this can be accomplished (see Ill. 91). First secure a good brass spraying pump mounted on a barrel supplied with an agitator. Set the barrel on a cart, waggon or hand-cart. Select a nozzle which is easily cleaned, and that will break up the solution so that it will leave the nozzle like a mist. As a fine spray cannot be thrown any distance, it is advisable to attach two nozzles to a bamboo pole by a T (see Ill. 91) and the hose fastened to the other end of the pole.

**Apple
Insects.**

The solution to be applied for masticatory insects, such as caterpillars and beetles, is one pound of Paris green to two hundred gallons of water. For suctorial insects, such as Aphides and Scale insects, use kerosene emulsion, made after the following formula: Hard soap, one half pound, or soft soap, one quart; boiling water (soft) one gallon; coal oil, two gallons. After dissolving the soap in the water, add the coal oil and stir well for from five to ten minutes. In using, dilute with from ten to twelve parts of water.

**Kerosene
Emulsion.****Apple Scab
Treatment.**

For treating the scab, use a Bordeaux mixture made according to the following formula: Copper sulphate, four pounds; lime (fresh), four pounds; water, forty gallons. Suspend the copper sulphate in five gallons of warm water. This may be done by putting it in a bag made of coarse material, and hanging it so as to be covered by the water. Slake the lime in about



89. APPLE—NORTHERN SPY.

**Spraying
Solution.**

the same quantity of water, then mix the two, and add the remainder of the forty gallons of water. It is best to combine the Paris green and the Bordeaux mixture, and in this way



90. APPLE—SUTTON BEAUTY.

apply a combined insecticide and fungicide. The results are as good as if each were applied separately. The following is the proper treatment for an orchard: For destroying codling

moth, bud moth, tent caterpillars, canker worm, apple spot and leaf blight (first spraying) apply Bordeaux mixture and the Paris green (four ounces of Paris green to a barrel of the mixture) when the buds are swelling.

Second spraying: Bordeaux mixture and Paris green before the blossoms open.

Time to
Spray.



91. SPRAYER.

Third spraying: Bordeaux mixture and Paris green when the blossoms have fallen.

Fourth and fifth sprayings: Bordeaux mixture and Paris green at intervals of ten and fifteen days.

A sixth application may be necessary if any scale should appear on the fruit or leaves.

**Spraying
Potatoes.**

The same pump and barrel is used for spraying Potatoes for the beetle (*Doryphora* and *Decom-lineata*). The preparation for this purpose is one pound of Paris green to a barrel of water, placed on a cart or other one-horse vehicle so that while the horse is walking in one drill the wheels will be in the two adjoining. With the drills thirty inches apart, a T sprayer can be made with one-inch iron gas pipe so as to spray four or six drills at a time. One man sits behind and attends to the sprayer and another works the pump.

CHAPTER III.

SECTION I.

FARM IMPLEMENTS AND BUILDINGS.

In the first place it is desirable to purchase only such implements as are necessary and best suited for the different kinds of work for which they are intended. An expensive implement is not always the best. The rule should be to buy only such implements as are necessary and up-to-date, and on no account to buy an implement that is not required on the farm. The whole assortment of implements should be cared for in the best possible manner, with a view to extending their time of usefulness.

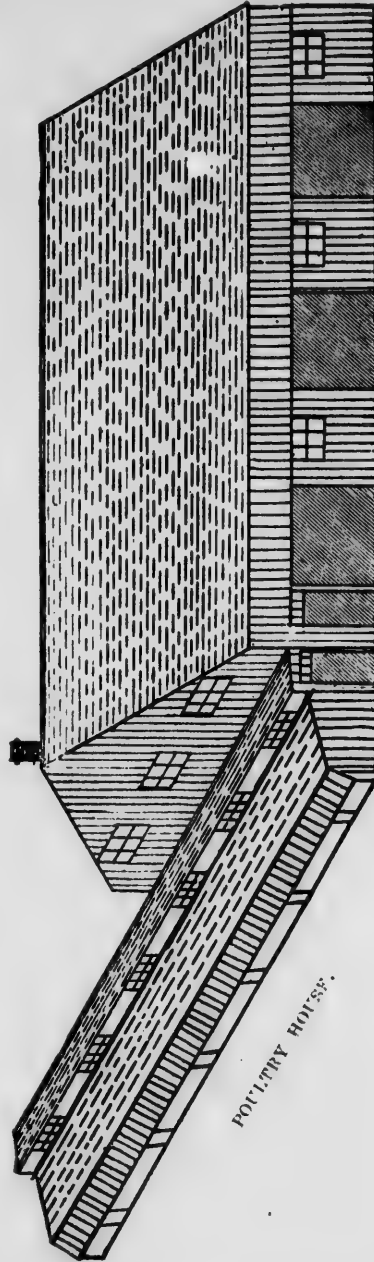
Purchasing
Implements

The first thing to be done is to provide an implement and tool house (see elevation, Ill. 92), and the second to see that every implement and tool is under cover, and in its proper place when not in actual use.

Implement
House.

Exposure to rains and sun is ruinous to implements, even to those which are constructed of iron or steel. It is a saving of time and money to keep all the farm machinery, implements, etc., under cover, and in their place, and keep every implement in good working order. The implements and tools should be painted occasionally, a work which may be done on mild days during the winter season.

Exposure
Ruins
Implements



92. ELEVATION OF IMPLEMENT HOUSE.

In one end of the implement house there should be a forge (a cheap fan forge is all that is necessary), with an anvil and a few blacksmith's tools. Most men, if at all "handy," can do ordinary repairs on a farm, and save not only expense, but also the time of going to the blacksmith shop, which is often worth more than the cost of repairing.

Blacksmith
Forge.

In addition to a blacksmith's bench and tools, in the same end of the building, there should be a carpenter's bench, provided with such tools as are necessary to do ordinary woodwork repairs. Extra sets of whipple trees should be kept on hand in case of breakage, and hooks for all the spades, shovels, scythes, forks, etc.

Work
Bench and
Tools.

The location of the building should be convenient to both the barn and the house (see diagram of farm, page 32), and at the same time be isolated for safety in case of fire.

The size of the building must correspond to the requirement of the farm. For a farm of one hundred and fifty acres, a building sixty feet long by twenty-six feet wide (see plan, Ill. 93) will not be too large for all the farm machinery, implements, waggons, sleighs, carriages, cutters, etc. The building need not be high unless the loft is required for hay. This, however, is not desirable, as more or less dust will get through, and, besides destroying, will make the implements and vehicles look untidy.

Dimensions
of Building.



GROUND PLAN OF IMPLEMENT HOUSE.

93. GROUND PLAN OF POULTRY HOUSE.

The floor should be low so that the waggon and implements can be taken out or put in by hand. An earth floor, slightly higher than the surrounding ground, is all that is necessary. In a building sixty feet long three doors are all that are required, each nine feet wide, with the spaces also nine feet. Hang the doors with pulleys on an iron bar running the whole length. The doors can all be opened without interfering with each other.

Low Floor.

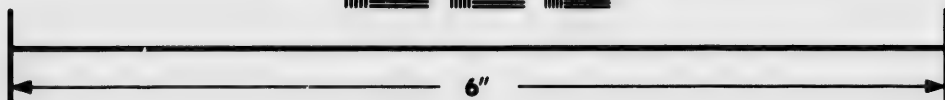
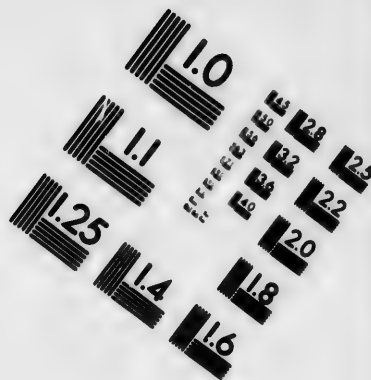
Doors with
Rollers.

SECTION II.

FARM BARN.

The most important building on the farm is the barn. The location of the barn has much to do with the profits of the farm. Not only have the handling and storing of the crops to be considered, but the housing of the live stock, so as to get the best results at the least cost. The first thing to consider is the system of farming to be adopted. If dairying, will it be home dairying, or will the milk be sent to the factory, or is the intention to raise pure-bred stock. It may be that the farm and location are suitable for summer grazing, selling the stock in autumn. In this case little or no stabling is required. The method that many are following with good results, that is, buying stock in the autumn, fattening them during the winter, and selling in the spring, requires considerable stable-room.

System of
Farming.



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**Farm
Barn.**

These all require buildings, especially arranged, and, in giving the design for a barn, I will have to go on general principles. In the first place, it is desirable, for convenience, to have the live stock under one roof, or in buildings close together. Horses and cattle do all right in a stone or concrete basement; sheep and pigs do better in separate and wood buildings.

**Sheep and
Pigs
Separate
Buildings.****End Drive
or Side.**

Whether a barn with an end or side drive is preferable is a debatable question. With an end drive, that is one in the centre, there is a large amount of space lost, since the driveway comes under the highest part of the roof. In a side drive, where the barn is over sixty feet long, it is necessary to have two drives.

**Size of
Barn.**

For a farm of from one hundred and fifty to two hundred acres, the barn should be sixty feet wide by one hundred feet long, with twenty-four feet posts (see Elevation 94). The mows are twenty-seven feet deep; the driveways twelve feet each and the space between twenty-one feet, half of which is for the granary. The balance between the driveways is convenient for turning the waggons on, by driving in one way and out the other. When not required for storing grain, it can also be used for storing chaff or straw, which is too valuable to be stacked in the yard.

**Flooring
Barn.**

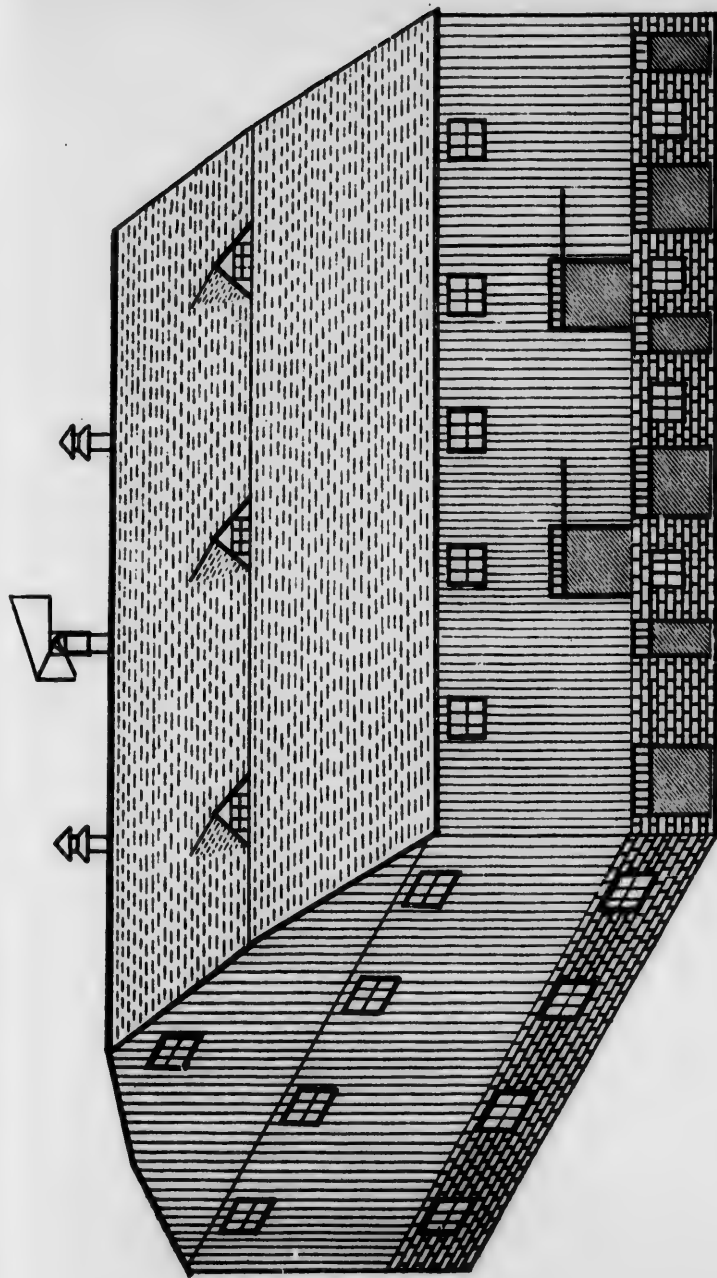
The whole of the ground floor should be covered with two thicknesses of inch boards, twelve inches wide. First cover with inch hem-

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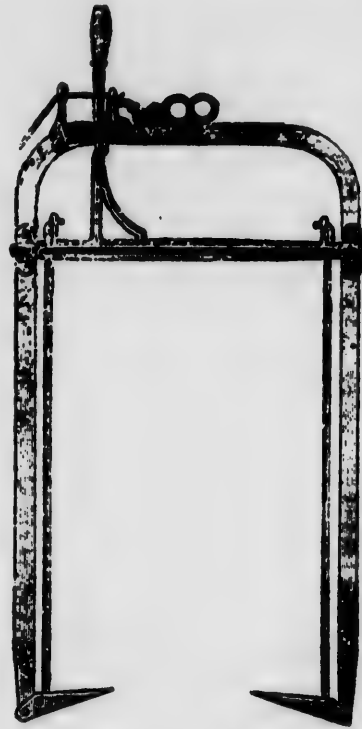
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94. ELEVATION OF BARN.

lock nailed to the joists. Then cover over with tar paper, then a layer of pine boards, laid so as to break the joints. These also require nailing to the joists to prevent rising, caused by the steam from cattle underneath. The tar

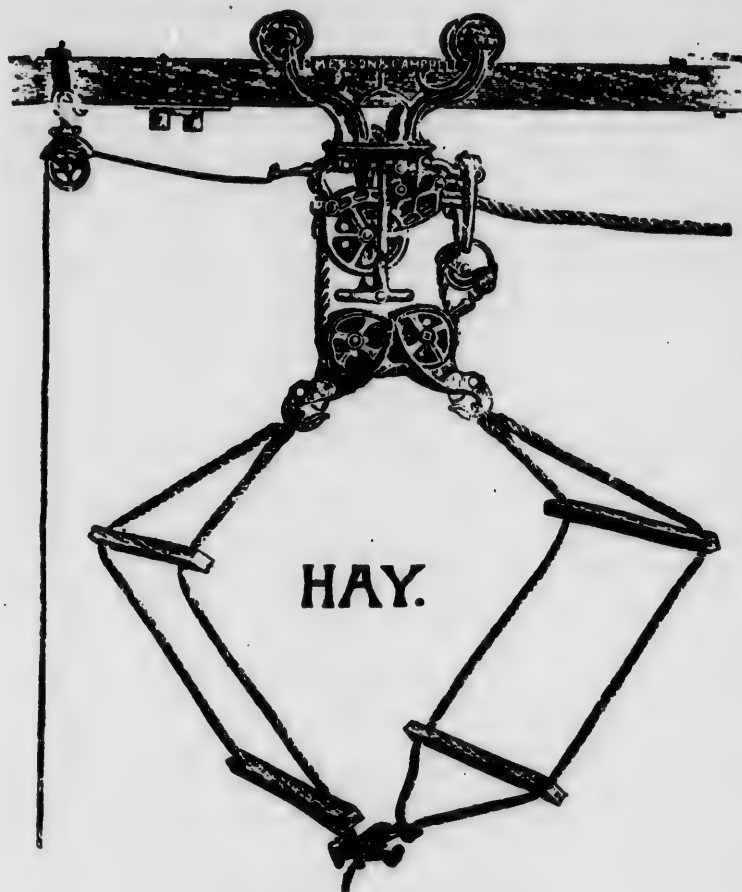


95. DOUBLE HARPOON HAY FORK.

paper, in addition to keeping vermin from eating the floor, prevents dust from passing through. It is advisable to have as few beams as possible.

Doors.

The barn doors should be hung with rollers on an iron bar. There should be sufficient



96. HAY CARRIER AND SLINGS.

windows for light, and these so arranged that Windows.
 even when the barn is filled with the crops a
 number of them will not be covered.

The roof should not be higher than is neces- Roof.
 sary, which will save considerable in the cost.
 A curb roof economizes space, and with this

style the barn can be better lighted (see Elevation 94).

**Sheeting
Barn.**

The sheeting for the outside of a barn, and the other farm buildings, should be of pine boards, one inch thick and ten inches wide, and dressed on the outside. The joints should be covered with battens, one inch by two and a half, which should be nailed on perfectly perpendicular.

**Filling the
Barn.**

In order to save time and labor, the storing of crops requires special attention. There is no difficulty in filling the bottom portion of the mows, but the unsolved question is the most economical and practical method of filling the top portions, particularly with sheaves. The Double harpoon hay fork (see Ill. 95) is all right for hay and peas but is useless for sheaves.

**Unloading
Grain.**

The slings with double power pulleys (see Ill. 96) handle both sheaves and hay or peas satisfactorily, but they are expensive. Besides there is considerable time lost in the field putting them into proper shape. The rack lifter has many advocates, but there is also time lost in raising the load and again lowering the rack and replacing it on the waggon. For a moderately high barn, and for lofts, the harpoon horse fork is satisfactory for both hay and loose grain. The sheaves can be handled satisfactorily by having an extra man on a scaffold.

It is an advantage, but not necessary, for a basement barn to be on the side of a bank. For the driveways it is advisable to build a wall, twelve feet from the barn, and cover it with plank. This will keep the embankment back from the basement wall, and will allow more light and air into the basement. The material for a basement may be either stone, brick, or concrete, the latter being durable and satisfactory. The floors should be concrete.

Entrance
to Barn.

Concrete
Floors.

In building and arranging a basement for barn (see Ill. 97) intended for live stock it is essential to provide for light and pure air. (See ground plan). According to recent scientific experiments light is a preventative of many infectious diseases. It destroys most bad germs, such as those of consumption (Tuberculosis) and diphtheria. It is, therefore, important that we should arrange to get all the light possible, not only into our cattle stables, but also into our dwelling houses.

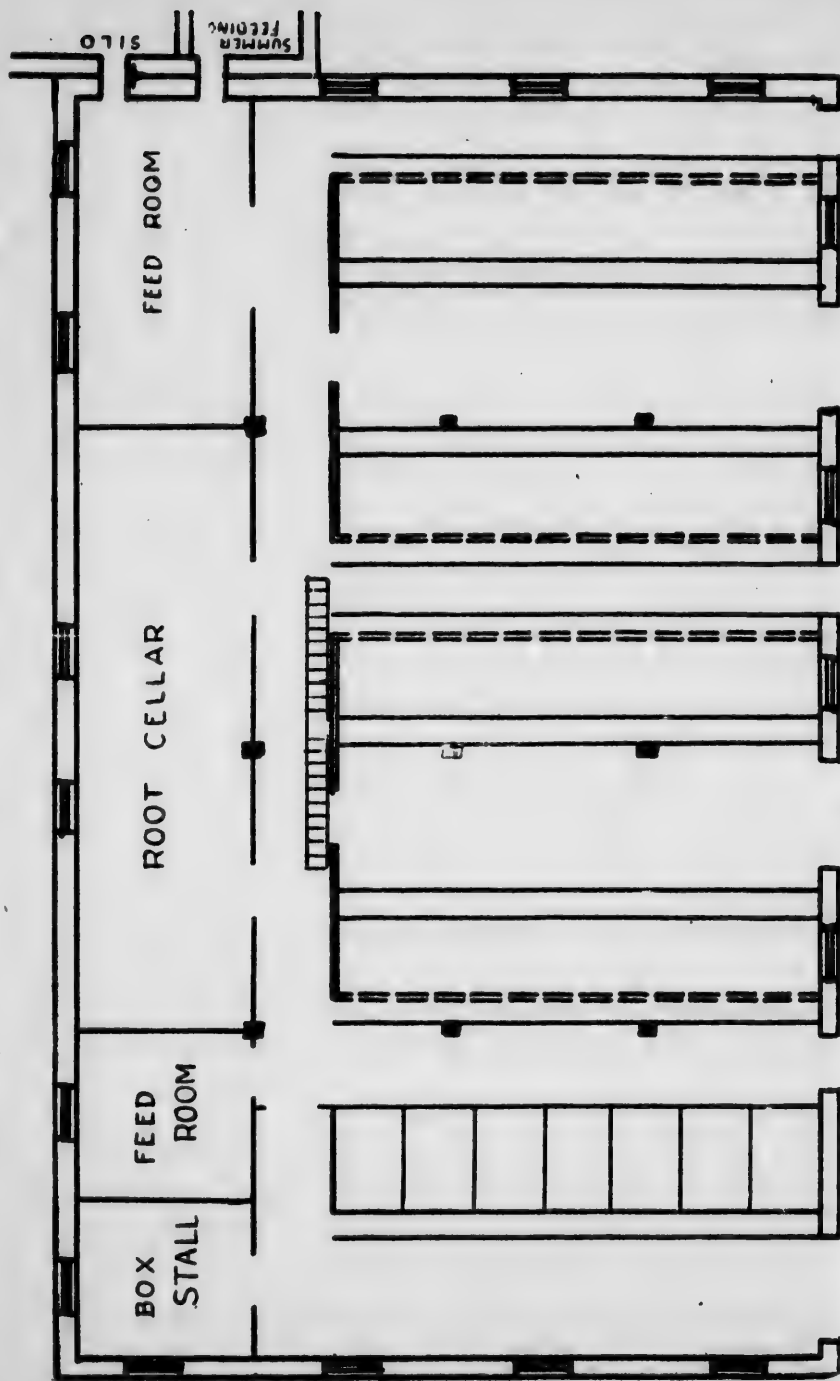
Light and
Air
Essential.

The old bank barn, with the projecting roof in front, is too dark. The floor of the basement should be above the barn yard, the walls ten feet high, with all the windows possible on all sides, so that the stables will be nearly as light as it is out of doors.

Old Style
Unhealthy.

The ventilation is all important. By properly arranged ventilation the impure air is removed and replaced by pure. This constant change of

Ventilation
Important.



[194]

97. BASEMENT OF BARN.

Scale $\frac{1}{8}$ inch to the foot.

the air in the stables is absolutely necessary to preserve the health of the animals.

Proper ventilation provides for this. For introducing fresh air into the stable, erect, on top of the barn, a galvanized sheet-iron pipe, fifteen inches in diameter, and constructed to revolve so that the mouth will always face the wind, insuring a constant supply of fresh air in the stables. The conductor runs from the roof down to the floor of basement and may be made of wood, fastened to a post, thence connected with ten-inch sewer pipes, running down two feet below the concrete floor; the joints and ends require to be cemented and made perfectly water tight.

Modern
Ventilation.

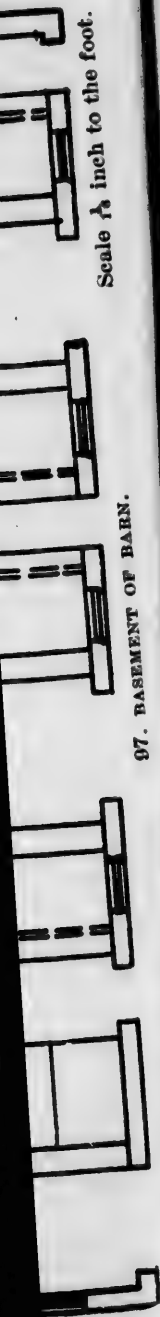
Conductors
of Pure Air.

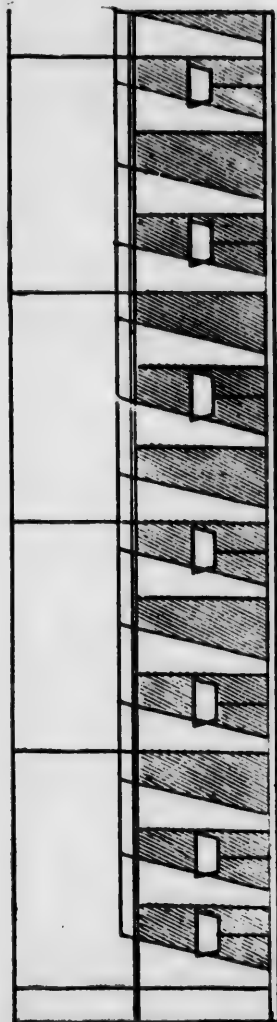
To moderate the fresh air the sewer pipes are laid across the cattle stable, and at each feeding trough a two and a half inch gas pipe is connected with the sewer pipe below, and with a two and a half inch gas pipe which is fastened with staples to the timber that forms the front of cattle feed trough, and two inches from the floor.

To Moderate
Fresh Air.

The distributing openings in this pipe are three-quarters of an inch on the underside, eighteen inches apart, and so arranged that an animal will stand between two openings. The foul air, being warmer than the incoming fresh air, is forced upwards through flues which open into the stable at the ceiling, and run up by a post through the roof. The portion above the

Distributing
Fresh Air.





99. STATIONARY STANCHION.

98. BASEMENT FLOOR.
Scale $\frac{1}{16}$ inch to the foot.

roof may be a round galvanized pipe, twelve inches in diameter, with a flange around the top, and a dome one foot above to cause a suction. This system of ventilation has proved to be quite satisfactory.

The following plan of basement (see basement plan, Ill. 97) is arranged for seven horses and fifty-two cows (or other cattle), and a loose box. The stable is so arranged that box stalls can be made in the cattle compartment by using hurdles. Then there is horse and cattle feed

Plan of
Basement.

Feed Rooms



100. SWINGING STANCHION.

rooms, and also a root cellar on the north side. The size of barn and basement can be increased or decreased according to the requirements. The stanchion used has the advantage of a draw rod which opens all the stanchions in a row (see Ill. 99), which can again be closed as soon as the cattle are free; the swinging stanchions allow the cattle more freedom, but are not so convenient (see Ill. 100) (stalls in a cattle stable are found to be useless). By having the cattle dehorned they may be let loose, for exercise, in the stable without being turned out of doors in

Cattle
Stanchion.

cold weather. Cast iron water basins are fastened on the partitions, arranged so that one basin will supply two animals. For details see the plan of basement (99).

SECTION III.

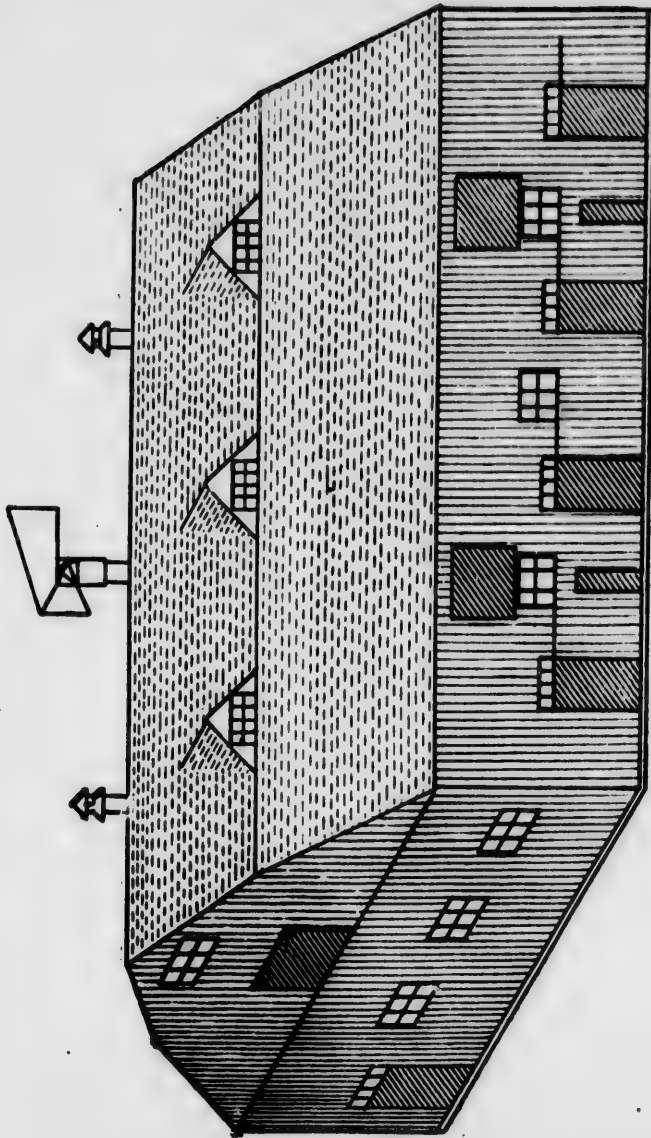
SHEEP PEN.

Sheep Pen. For location of the sheep pen see farm diagram on page 32.

Cattle and Sheep Separate. As cattle do not thrive on the same pasture along with sheep, it is advisable not to keep both, unless they can be kept on separate pastures. For winter feeding, sheep (particularly lambs) give good returns when properly managed. In the first place, they require a dry building with plenty of light and fresh air. (See elevation 101).

Plan of Building. In deciding on the size of a building, allow from twenty to twenty-five square feet for each animal, according to the size. For the best average results there should not be too many together. A flock of sixty sheep will require a building thirty by sixty feet, with a passage on one side of five feet, leaving an inside space of fifty-nine by twenty-three feet for the sixty sheep. This should be divided into four compartments (see ground plan 102) of fourteen by twenty-three feet each in the clear, which is ample for fifteen sheep. The centre is a plain partition, while the other two answer the double purpose

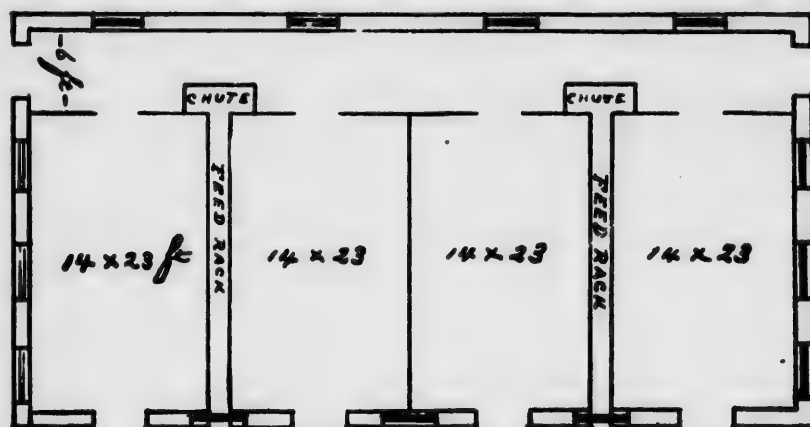
Compartment.



101. ELEVATION OF SHEEP HOUSE.

Feeding
Rack.

of partition and feed trough. (See diagram 102). The bottom of the rack is a plank, sixteen inches wide, raised from the floor eight inches, and on each edge a six-inch board is nailed, projecting above the plank four inches to form the trough. Another six-inch board is made stationary, parallel to form top of rack, leaving a space between of two and a half feet. The uprights are inch boards, eight inches wide



102. GROUND PLAN OF SHEEP HOUSE.

Scale $\frac{1}{4}$ inch to the foot.

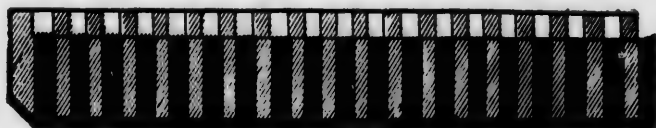
and three feet long, nailed at the bottom and top, leaving spaces between of seven inches for the sheep to put in their heads and feed. Whether it be grain, roots, or coarse fodder, each sheep secures an opening, and cannot be moved by another. The rack has an opening at each end. The entrance next the passage is for feeding, the other is to clean out the refuse

into the yard. (See plan 102). Portable racks made on the same principle are convenient for feeding sheep in the yard or field. (See Ill. 103). An earth floor is all that is necessary for sheep. From floor to ceiling should be ten feet. The length of posts are sixteen feet from the ground to the plate, and with a curb roof leaves ample provision for hay and other fodder.

Portable
Rack.

The stone foundation should only rise a few inches above the surface on which the posts stand. The outside sheeting should first be inch boards put on horizontal and covered with tar

Interior and
Ventilation.



103. FEED RACK.

paper. Then cover with ten-inch boards, and two and a half inch battens (perpendicular, the same as on the barn). It is most important for the health of the sheep that they receive plenty of light. (See plan elevation 101). The ventilation should be on the same principle as that of the barn. The fresh air will be conducted down the centre post into an eight-inch sewer pipe, laid two feet below the ground and lengthwise of the building. The joints and ends require to be made water-tight. Underneath the racks are two and a half inch gas pipes fastened underneath to the plank below. These

Fresh Air
and Light.

Gas from
Manure
Injurious.

are connected to the sewer pipe below. The gas pipes have openings underneath of three-quarters of an inch each and eighteen inches apart. This will be sufficient to raise the foul gas that may be formed under ordinary circumstances. Sheep manure should not be allowed to accumulate in the pen, the gas from it being very injurious to the health of the animals. Two flues which open from the ceiling and lead to the ventilators on top of the sheep pen should be constructed. These are same style as on the barn but of smaller size.

SECTION IV.

PIGGERY.

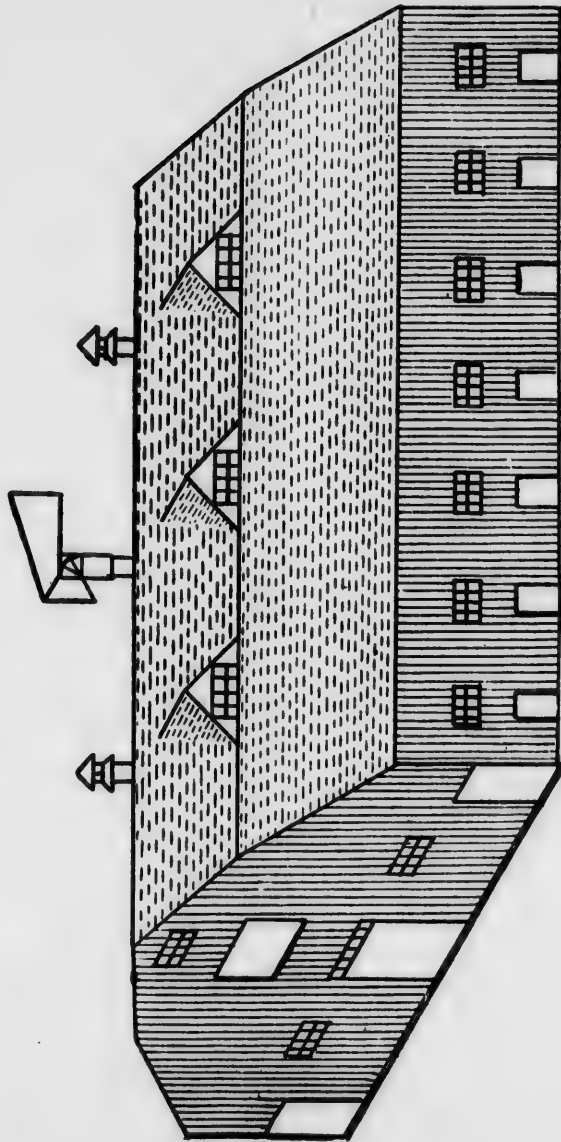
The last, but not the least important of the farm buildings, is the piggery. The number of pigs that can be profitably kept on a farm depends on circumstances. Pigs are more profitably fed in conjunction with a dairy.

Skim Milk
Pork.

They make greater gain and give a better quality of pork when fed skim milk along with middlings and other foods.

Size of
Piggery.

In deciding on the size of a building for a piggery, estimate for four or five feeding pigs to consume the bi-products of each cow, say forty-five feeding pigs for ten cows (see elevation 104) and for space, estimate twenty square feet for each pig weighing from one hundred to two hundred pounds each. A pen eight by ten feet, that is, eighty square feet, is sufficient



104. ELEVATION OF PIGGERY.

for four pigs not exceeding two hundred pounds each.

**Clean
Animal.**

While the pig is by many considered a filthy animal, yet, when proper provision is made, there is none more cleanly. In summer there is no difficulty in keeping the pens clean when they have an outside yard, but in winter, when they must be kept inside where it is dry and warm, care and attention are necessary. While

**Require
Protection.**

other animals are protected against the cold with a good coat of hair or wool, the pig has almost no covering. For that reason it requires special protection in order to get the best returns for the food consumed. The doors leading to the outside yards must therefore be closed in winter.

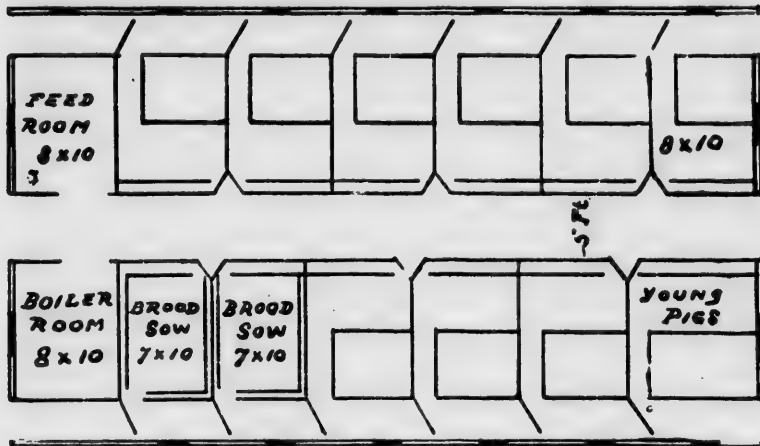
**Gutters
Inside.**

It is necessary at the back of pens to have a gutter, which should be three feet wide and three inches deep. It is advisable to have the entire floor of the piggery made of cement, the beds to be covered with two-inch plank for protection against cold and dampness. The beds should have a three-inch scantling nailed on the edge to keep in bedding. The two seven-foot pens for brood sows (see ground plan 105) should be covered entirely with plank, also have a plank eight inches wide nailed to sides horizontally eight inches from the floor, to prevent the sow lying on her young pigs.

It is important that a piggery should be constructed so as to be both dry and warm in

winter. A wooden building on a stone or cement foundation is considered the most satisfactory. The building should be double sheeted on the outside, with tar paper between, also sheeted on the inside. The posts may be twelve feet high from the foundation which is level with floor of piggery, viz., eight feet to the ceiling and four feet above. For the health of

Stone or
Cement
Foundation.



105. GROUND PLAN OF PIGGERY.

Scale $\frac{1}{16}$ inch to the foot.

the animals, it is necessary to let in all the light possible. (See elevation 104). The size of building given in plan is thirty-two feet wide by fifty-seven long. This allows three feet each for the gutters in the rear, ten feet in depth for the pens, and five feet for the centre passage. The floor of the pen may be level when the bed

Provide for
Light.

Size of Pens.

is elevated. Any filth that may accumulate can be swept into the gutter at the back.

The trough is made V shaped, and, for this, cement is the most durable. The partition over and in front of the trough should be on hinges so that, for convenience in feeding, it can be swung to the inside edge of the trough.

**Style of
Building.**

The roof should be the same style as the barn and sheep pen for light and uniformity.

Ventilation.

The ventilation should be on the same principle. (See elevation 104). The fresh air entering the galvanized conduit on the roof-top will pass down a wooden flue near the centre of the building, and at one side of the passage, to an eight-inch sewer pipe extending from the floor to an eight-inch pipe, two feet below, which is laid across the pen ten feet in length. Both the ends and joints must be securely closed to prevent water getting in. From the sewer pipe below is connected a gas pipe on each side of the passage by drilling holes in the sewer pipe below. After inserting the gas pipes, fill around with cement. The gas pipes will extend four and a half feet above the floor. To these are attached two and a half inch gas pipes running the length of the building and fastened to the uprights on each side of the passage, and on the inside over the trough. On the under side are three-quarter inch openings, eighteen inches apart, and at such an angle as not to cause a draught on the pigs when feeding. The

**Distributing
Fresh Air.**

two ventilators extend from the ceiling to the top of the building according to plan.

SECTION V.

CONVENIENCE OF BUILDINGS.

Farm buildings constructed according to the plans and specifications given are economical considering the advantages for convenience, and health of the animals.

Painting
Buildings.

Painting farm buildings outside gives them a more attractive appearance, besides adding to their durability. In the erection of buildings it is advisable to have all the lumber dressed on the outside. The first thing to decide is the color. This should not be too loud. A drab with brown trimmings is quiet and attractive. The cheapest color is to paint the trimmings, viz., cornices, window and door casings, with mineral brown, which is worth about one dollar and fifty cents per hundred pounds. Mix a portion with boiled linseed oil to the consistency of thick cream, and thin to the desired consistency with benzine. In two or three years nature will color the balance a uniform drab, that will harmonize with the natural surroundings. The trimmings in all cases should be painted darker than the body of the building. This is in accordance with the laws of æsthetics. The following mixture makes a satisfactory drab: seventy-five pounds of mineral drab, and

Cheapest
Paint.

Mixing
Paint.

Natural
Color.

twenty-five pounds of white lead, mixed with boiled linseed oil and thinned with benzine, the same as for the brown.

Buildings,
etc., to
Harmonize.

It is preferable to decide on a certain color and have all the buildings, fences, etc., made to harmonize.

CHAPTER IV.

SECTION I.

ECONOMIC FEEDING.

The economic feeding of live stock is, at the present time, receiving more special attention by those in charge of our experiment stations than any other subject in connection with agriculture. The object is to get the largest results at the least cost. During the past few years much knowledge has been gained in preparing and balancing the foods for the different animals, so that the rations may be composed of the proper constituents and quantities most suitable for the desired objects to be gained at the minimum cost. With our present knowledge we receive as good results at about half the cost of former years.

Balanced
Rations.

Our first object lesson we get from the laws of nature is "June conditions." When the weather is warm, and the grass in a succulent condition, the best results are obtained from our animals. Especially is this noticeable in milch cows. According to the teaching of science, the food should be of a certain composition to obtain the required objects, be it milk, flesh, bone and muscle or fat. In practice, the preparation of the food is found to be of equal importance. While the grass is in a succulent condition all

June
Conditions.

Composition
of Foods.

**Succulent
Food.**

animals thrive and do well, whether it is balanced according to science or not. As soon as the grass becomes dry there is a falling off, more noticeable in milch cows. Provision should be made for a continuous supply of succulent food during the whole year, both by carrying over a quantity of silage, and by growing soiling crops, sown at intervals, say an acre or more of mixed peas and oats (two bushels of peas and one bushel of oats), sown early in the spring, and an equal quantity a month afterwards. When this is fed, early sweet corn sown last of May, will be ready for use.

**Soiling
Crops.****Autumn
Feeding.**

This brings us now to the fall, when the pastures are again green, and with corn, rape and mangel wurzels, the cows should continue to give a full supply of milk, and all the other animals on the farm keep on improving with little or no grain, provided "June conditions" are maintained, by keeping the animals warm and comfortable.

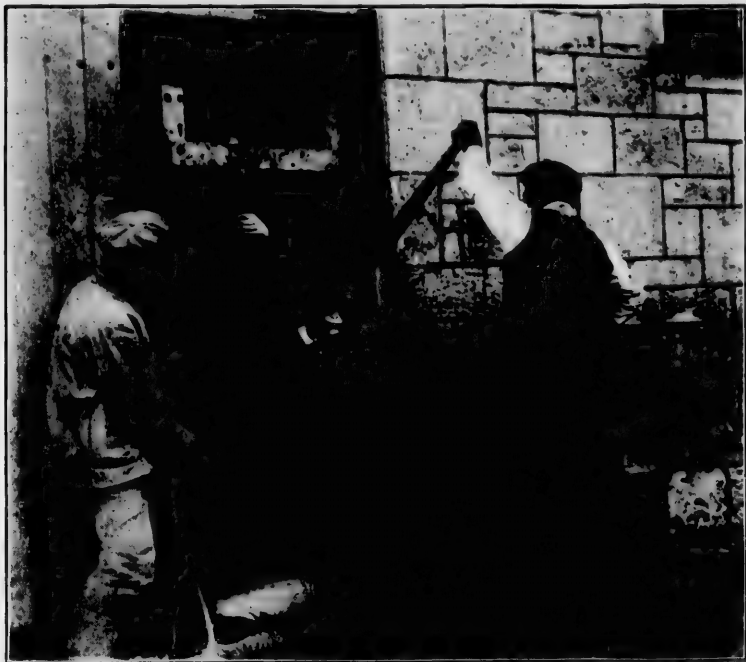
**Warm and
Comfort-
able.**

No farmer can afford to have his animals exposed to cold weather in the fall of the year. When the weather becomes cold all animals should be comfortably housed, and not let out of doors except when the weather is quite warm, not even for exercise. According to experiments, cattle do very much better when kept in a warm and properly ventilated stable all winter, without being turned out of doors.

**Ventilated
Stables.**

In that case it will be necessary to have them dehorned, so that they cannot injure each other. (See Ill. 106). Dehorning is now becoming quite common throughout the country. It makes the animals more docile, and less fretful,

Dehorning
Cattle.



106. DEHORNING CATTLE.

consequently they do very much better. With the proper appliances, and an operator with some nerve, the work is simple and expeditious. The horn should be cut off close to the head, otherwise a nubbin of a horn will grow again.

**Exercising
Animals.**

With stables and stanchions arranged as in plan (see Ill. 97) the animals can be turned loose with little trouble. It is advisable to divide the cattle, when loose, in groups of eight or ten each, with temporary partitions between. They will be more contented. If there is no provision for a water supply, a tank should be kept in the stable, filled with water, so that the cold chill may be taken off. From this the cattle may be watered with a pail.

**Small
Groups.****Water in
Stable.****Winter
Feed.**

The preparation of the food for cattle in winter will have to be varied according to the supply on hand. The first essential is clover hay. Clover is a flesh former, and gives strength to the animal. It improves and balances the ration when mixed with other and more concentrated foods. For economic feeding, corn silage is the most profitable crop that a farmer can grow. According to analysis, valuing clover hay at six dollars per ton, silage is worth two dollars and fifty cents. Practical results depend very much on the preparation of the foods. While dry fodder corn, according to analysis, compares favorably with silage, yet in practical tests, there is considerable difference in favor of the silage. While field roots are composed of from eighty-five to ninety per cent. water, yet they are essential in the preparation of a succulent winter food. With a supply of clover hay, straw and chaff, silage and roots,

**Nutritive
Value of
Fodder
Crops.****Corn Silage.**

prepared according to the following directions satisfactory results will be gained.

First, spread on the floor of the feed room a layer of cut clover and cut straw or chaff, three or four inches deep. Over this sprinkle a little salt, estimating that each animal receive half an ounce per day. It is better to dissolve the salt in water, and sprinkle it over the cut feed with a watering can. The second layer is silage about two inches deep. The third is another layer of cut clover and chaff with another sprinkling of salt. The fourth layer, pulped turnips, mangels, or sugar beets, between one and two inches deep. The above order to be kept until the heap is about four feet high. It should be tramped and kept perpendicular at the edges. The size of the heap will of course vary according to the number of animals to be fed. It is advisable to prepare at each time sufficient for a day and about twelve hours ahead, so that the whole mass will become quite moist by the liquid from the roots soaking through the cut feed, and the fermentation from the silage warming up the whole mass, making it succulent like grass.

**Preparation
of Food.**

**Allow
Twelve
Hours to
Moisten.**

In preparing the mixture the following proportions may be taken as a guide: Silage, twenty-five pounds; roots, twenty pounds; cut clover and chaff, twelve pounds; total, fifty-seven pounds. This should be varied according to the capacity of the animals. As a substitute

**Quantities
of Mixture.**

**Alternative
for
Deficiency.**

for clover hay, pea straw may be used with satisfactory results, as this is also one of the legumes.

**Feed Proper
Proportion.**

In case of a shortage of pulped roots, the cut feed may be moistened with salt water applied with a watering can, and in case of a shortage of silage, additional grain should be fed. When feeding the above mixture com-

**Feeding
Meal in
Mixture.**

mence at one end so that the quality will be equal for each animal. To get the best results from feeding grain it should be ground and mixed with bran, and in case of all the cattle getting grain, it is advisable to put the required amount on each layer of cut clover and chaff. Usually this is not practicable, as the several animals require more or less grain according to circumstances.

SECTION II.

HOW AND WHEN TO FEED.

**Limited
Quantity.**

How and when to feed animals has much to do with the results. Cattle should be fed early in the morning during the winter season, say between five and six o'clock. Have the cows milked, stables cleaned out, cattle bedded and watered before breakfast, and feed no more than they will eat in an hour or an hour and a half. Should any food be left over it must be cleaned away. When animals are not disturbed after being fed in the morning, they will rest con-

tented until noon. No animal should be fed "between meals." For best results this is important.

Nothing
between
Meals.

For cows giving milk the following ration will give satisfactory results, and at a moderate cost: In the morning, twenty pounds of the mixture, prepared as directed. If no ground grain and bran have been put in the mixture, scatter over the ration when in the manger three pounds of ground grain and bran mixed, two pounds of the former and one of the latter. At noon give fifteen pounds of the mixture and fifteen pounds of mangel wurzels or sugar beets, fed whole. Good results are obtainable by feeding roots only at noon without grain. The evening ration is the same as that in the morning. The feeder must use judgment to give each individual animal an amount equal for its capacity to utilize.

Ration for
Milk Cows.

Heifers and cows not in milk require only twenty-five pounds of the mixture in the morning, fifteen pounds at noon, and twenty-five pounds in the evening; total cost, six cents per day. This is sufficient to keep them in good growing and healthy condition. It is understood that they are to be comfortably housed and not turned out of doors in cold weather, otherwise it will require grain in addition to the above ration to keep up the animal heat.

Feeding
Store
Cattle.

Exercise
Indoors.

**Commercial
Foods.**

Good results can be obtained without commercial food. A limited quantity of oil cake and cotton seed meal may be fed to milch cows and beefing cattle to advantage, provided the cost is in proportion to the nutritive value of other foods. For the health and development of young cattle, they should be fed foods that will produce flesh, bone, and muscle, viz., clover, bran, roots, rape, etc. Fattening foods tend to disease and stunted development.

**Flesh
Forming
Food for
Young
Cattle.****Kind
Treatment.****Results of
Abuse.****Cattle Free
from
Vermin.**

While every provision may be made for the comfort of animals, and the feeding done strictly in accordance with the above directions, the animals will not give adequate returns for the food consumed unless they receive kind treatment. This is particularly noticeable with milch cows, say in the month of June, when on pasture and giving a large quantity of milk, if brought from the field hurriedly by a dog or a person on horseback, and milked while they are excited, the average results will be about half the usual quantity. Some of the more nervous cows will not give one fourth, and according to experiments it is found there is less butter fat in the milk. Any farmer who will abuse his animals, or allow them to be abused, had "better go out of the business." He cannot expect to get returns for the food consumed.

Cattle must also be kept free from vermin during the winter. The cattle should receive about three applications of seal oil (fish oil) and

crude carbolic acid, mixed, one gallon of the former, and four tablespoonfuls of the carbolic acid. Apply with an ordinary cattle brush, rubbing the cattle over the whole body. For about three months during the summer, when the horn fly is annoying the cattle, apply the above mixture once a week, and that tormentor will not trouble them. Although it is claimed that warbles come from the stomach of the animals and out through the skin on their back, at the same time it is noticeable that cattle which have been treated for the horn fly in summer are not affected with warbles in winter.

Preparation
for
Insecticide.

SECTION III.

BREEDS OF CATTLE.

In considering the comfort of the animals, a consideration which is essential to success is protection from the hot summer sun. They may be kept in the house during the heat of the day. This, of course, is attended with some additional labor. Several groups of maple and other trees, a plot a quarter of an acre or more in size, on rising portions of the farm, the trees planted about twenty feet apart, gives excellent shelter to the cattle, besides being ornamental. The advantage of having the trees grouped is that the sun cannot shine in to heat the ground, and when on rising ground there is usually a current of fresh air.

Shelter in
Pastures.

Groups of
Trees.

Plant on
Rising
Ground.



107. HOLSTEIN COW.

Single trees scattered over a farm give little shelter, and standing in growing crops they are a decided injury to the crop.

Scattered
Trees
Objection-
able.

In addition to the feeding and care of animals, there is the question of the breed that will give the best returns. This is a debatable question, particularly as regards milch cows. The large black and white "Holstein" (see Ill. 107) is no doubt the largest producer of milk, although as a rule it is not so rich in butter fat as that of some of the other breeds. Yet there are individual animals of the Holstein breed that give rich milk and that have made remarkable records. These animals have excellent digestive organs, and can make the best use of food. A delicate feeding cow is not a profitable animal.

Milch Cows.

Holstein.

While the quantity of milk can be increased by judicious feeding, yet the butter fat will remain in about the same proportion, but the flavor and color of the milk is changed materially by certain foods.

Increasing,
the
Production.

When cows are exposed to cold weather, the butter will be white in color, even though the food is of the best. Milch cows should be kept housed in the winter in a stable with temperature at about sixty-five degrees, milked regularly and by the same person.

Effect of
Cold.

In the selection of a milch cow, consider the following points: first, the "wedge shape" of the animal; a head fine and long; neck thin;

Selecting a
Milch Cow.



108. AYRSHIRE COW.

large, square udder, not fleshy ; barrel, deep and round. There are other signs, all of which fail in some animals, since the ancestors have much to do in stamping the offspring. There are other things to consider in developing a milker. One is to have the heifer come in at two years of age, and milk for at least one year. The most popular dairy cow in Great Britain is the "Ayrshire." (See Ill. 108). This breed originated, we understand, from a cross of the small "Durham" and the "Dutch" and "Channel Island" cattle. It is from the latter they owe their milking qualities. They have the typical wedge shape of dairy animals. The horns have an upward curve. The shoulders thin, and the loins broad. The prevailing color is a reddish brown and white. The udder is large. The cows are particularly hardy. After milking for a number of years, they can be fattened better than any of the other dairy breeds. For a fancy cow, and for making "gilt edge" butter, the "Jersey" (see Ill. 109) stands at the head. While the Jersey does not give as large a quantity of milk as the Holstein or Ayrshire, the milk is, as a rule, richer in butter fat, and superior in quality.

The butter being more marly and firmer does not get oily and soft in warm weather, like that from other breeds. Both the butter and cream command high prices.

Popular
Dairy Cow.

Fattening
Old Cows.

Fancy
Butter Cow.



109. JERSEY COW—"MARY ANNE OF ST. LAMBERTS."

As to shape, the "Jersey" has all the characteristics of a dairy cow; body round and deep, well ribbed with little space between the ribs and hips, udder large and well up behind, with large milk veins running well forward. The favorite color is a solid fawn. The "Guernsey" is a rather larger animal, with the butter quality of the Jersey. For dairy purposes, the beef breeds are not satisfactory. Some of them give a large flow of milk for a few months, then they commence to put the feed on their back instead of in the pail. The same is the case with many of the cows that are cross bred between the dairy and beef breeds. In using such cows for dairy purposes, it is advisable to milk them until they cease to give a paying quantity of milk, and are ready for the butcher, then sell and replace them with fresh milk cows.

Model
Jersey Cow.

Guernsey
Cow.

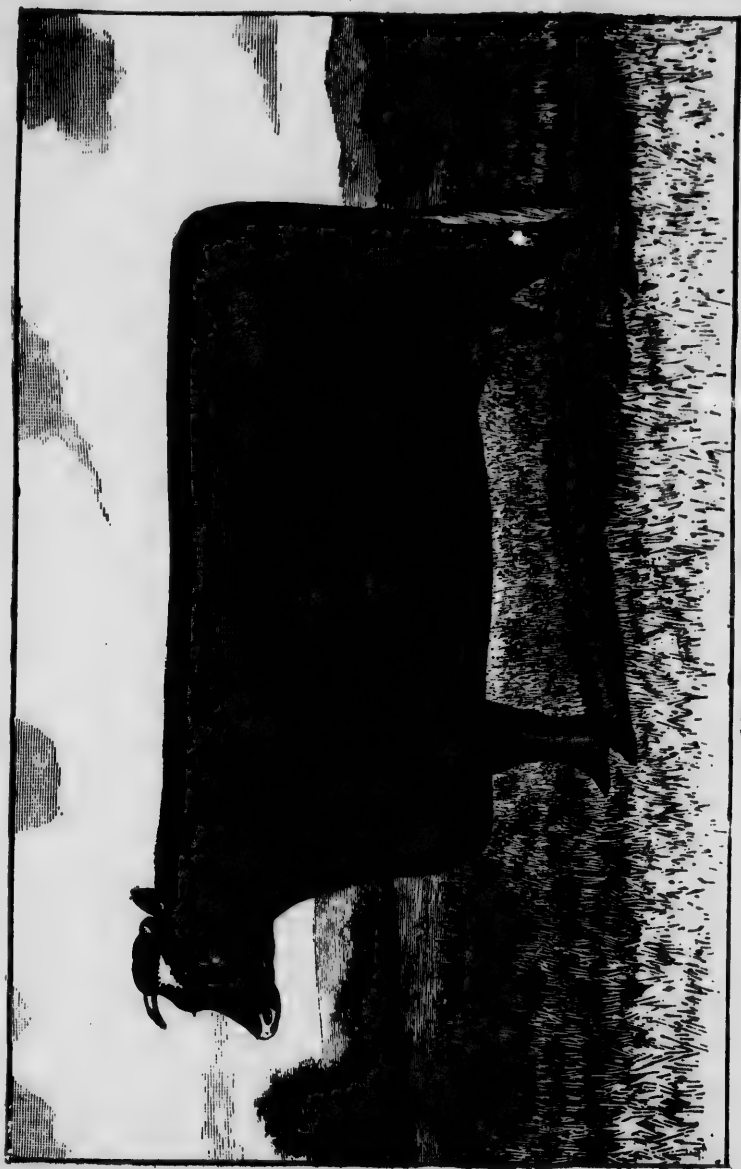
Beef Breeds
for Milk.

In deciding on what breed to keep, be governed according to your fancy, and the market for which the produce is intended for, whether for a cheese factory, creamery or a home dairy. If either or both of the former, the "Holstein" and "Ayrshire" will give the largest returns. For a home dairy, with an opportunity to work up a fancy city trade in cream and butter, the Jersey cow will fill the bill. There is an advantage in keeping pure-bred animals over grades. The calves are worth much more. As a rule, one good, pure-bred calf, a month old, will sell for as much as ten

Decide on
One Breed.

Largest
Returns.

Prices of
Calves.



110. COW—SHORTHORN "DURHAM."

grade calves at the same age. After the first week dairy calves should be fed skim milk, with a teacupful of ground flaxseed and middlings (mixed). These should be mixed before grinding. To keep them growing feed liberally with bulky succulent food, composed largely of clover, roots and silage. The heifers should have their first calf when two years old.

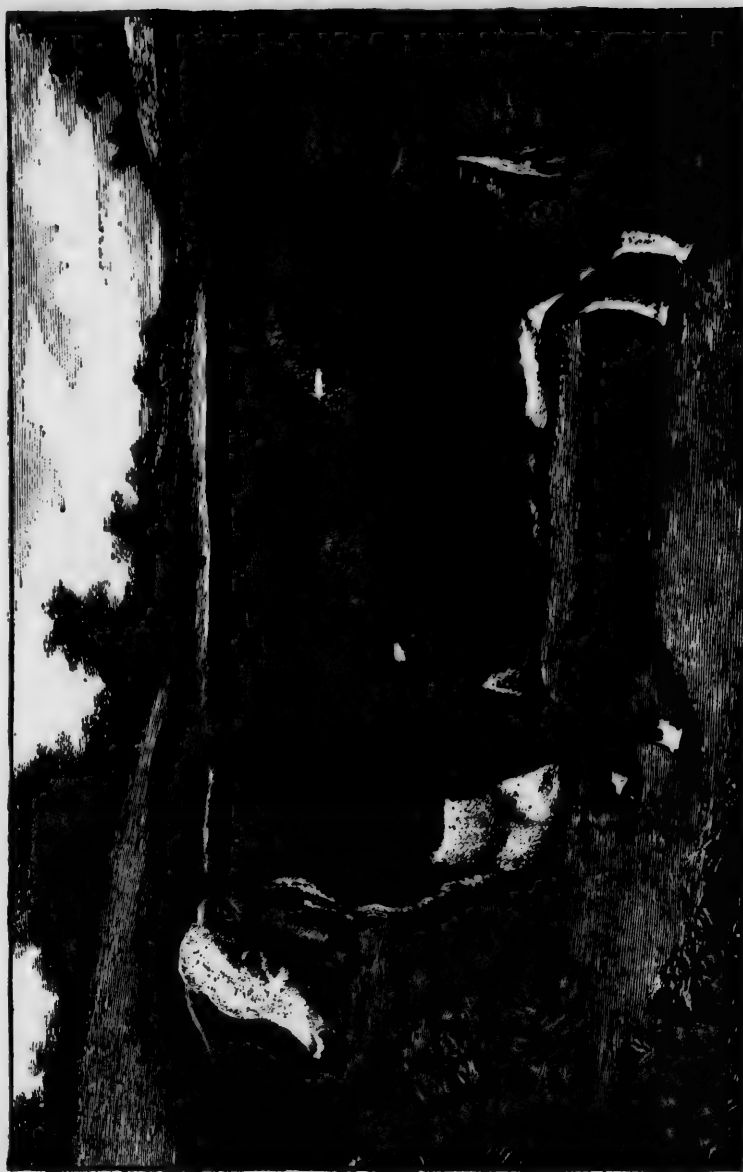
Feeding
Dairy
Calves.

It will now be in order to explain the characteristics of the "beef breeds" of cattle, the types of which are entirely different from the "wedge shaped" dairy breeds. In the first place, their general form is broad, deep, smooth and even, with parallel lines. Next in importance is a thick even covering of the right kind of meat in the parts that give the high priced cuts. A broad, well covered back and ribs are necessary, and no other excellencies, however great, will compensate for the lack of this quality. A good feeding animal should handle soft and mellow, have a vigorous constitution which is indicated by a broad chest, well sprung ribs, large heart girth, and general robust appearance. The shorthorn "Durham" (see Ill. 110) has more admirers than any other of the beef breeds. In cross breeding the prepotency of the sire is more pronounced than that of any other of the beef breeds. A marked change has taken place in the type of animal, since the demand of recent years is for early maturity, and a plump carcass of medium weight, and minimum offal.

Character-
istics of
Beef Breeds.

Beef Breeds.

Shorthorn.



111. HEREFORD COW.

The large, rough and patchy animals are no longer bred. The favorite colors are red and roan. The "Hereford" (see Ill. 111) is similar in conformation to the shorthorn and, like them, have been bred for beef, consequently they are seldom kept for dairy purposes. Their native home is Herefordshire, England. Their color is red with white face and white points. Formerly the horns were long and turned up. The present fancy is for shorter horns and turned down. They are excellent grazers. A herd of them is very attractive in appearance.

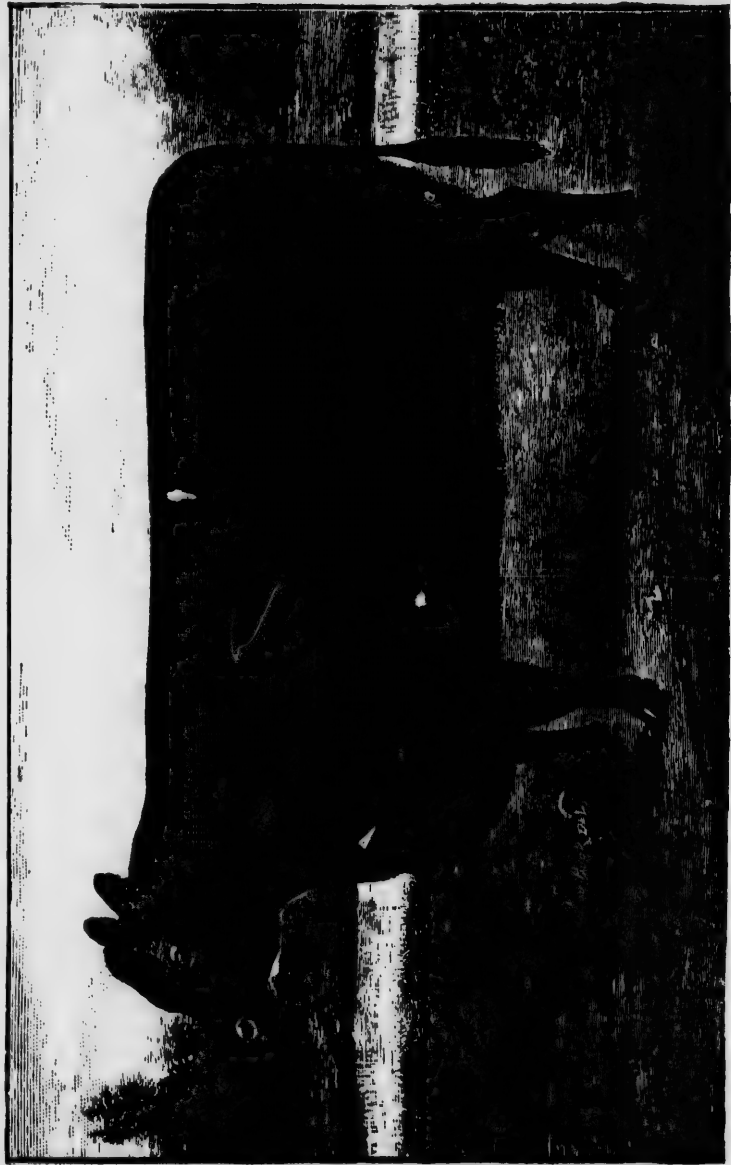
Hereford.

The "Aberdeen Angus" (see Ill. 112) is another of the popular beef breeds of cattle. As their name indicates, their native home is Aberdeenshire, Scotland. Their color is black. They are without horns. For quality of flesh they have no superior. They have been bred for beef, consequently are not intended for the dairy. There are several other beefing breeds of cattle, viz., "Galloway," "Sussex," "Devon," and the "Highland" cattle. These all have certain good qualities, but on account of their smaller size they have not become generally popular.

Aberdeen
Angus.Galloway.
Sussex.
Devon.

Calves of the beefing breeds require better care and feed than the dairy breeds. In order to get the best and quickest returns it is better to feed them whole milk for three or four months. Follow with good, succulent food, composed of clover, rape, roots, bran and silage.

Care of
Calves.



112. ABERDEEN ANGUS.

Feed little or no grain until the frame is developed.

If there is an abundance of good pasture buy the steers for winter feeding at the beginning of October. If pasture is scarce, do not buy until the time for housing. Put in a sufficient number to consume all the fodder, roots, and coarse grain grown on the farm. Buy young cattle, two or two and a half years old. Young growing cattle will increase in weight much more rapidly than those that are of mature age. Judging steers by points may be all right in a show ring, but for practical purposes about fifty per cent. should be on the back, as the most expensive cuts are the back and ribs. Crossing the dairy and beef breeds have made it very difficult to get the most desirable animals for feeding. While the gain of a dairy cross is nearly equal to that of a beef bred animal, yet the quality is entirely different. The dairy cross has a hard back with little flesh, and a large amount of tallow which is only worth one-fourth the price per pound of a good roast. For feeding, buy only the blocky, smooth animal with wide back and loose hide.

Buying
Steers.

Judging by
Points.

Cross Bred
Steers.

Feeding steers for profit is a subject that has received very great consideration, both privately and at our experiment stations. In the first place it has been proved beyond question that the best results are obtained by feeding loose. Steers, dehorned and fed loose,

Feeding
Steers.

will gain more in five months than those tied will gain in six, and on the same feed. In commencing to feed steers in the fall, it is better not to feed grain. Commence with a succulent food, prepared the same as described for milch cows. Feed this mixture morning and evening, with the addition of one pound of bran.

**Feeding
Rape.**

At noon, give a forkful of rape (Dwarf Essex) during November and December. This is cut with the scythe and thrown in small heaps after the ground is frozen, and carted to the stable and put into the feed room the day previous to thaw out.

**Feeding
Roots.**

After the rape is done, give the cattle, at noon, twelve pounds of the mixture, and twenty-five pounds of roots. With proper care and this cheap food, ten and eleven hundred pound steers will increase about two and a half pounds each per day. Some will increase over three pounds per day for the first sixty days. The increase is composed of flesh, bone and muscle.

**Feeding for
Frame.**

For the sake of frame work, feeding for fat should be left for the finish. For the third month, mix one pound of ground grain, composed of barley, oats and peas, with the pound of bran, spread on the feed, morning and evening; give no grain at noon. The fourth month, add another pound of grain, and the fifth month, another, which makes the grain ration for morning three pounds of ground grain, and one

**Increasing
the Ration.**

of bran, mixed. Give the same at the evening feed, which makes six pounds of grain and two of bran, which is sufficient to finish steers between thirteen and fourteen hundred pounds.

It is important to have beef animals finished in five or six months. After that time they will not increase sufficient to pay for the food consumed. Steers that have been bought and fed according to the above directions will make the selling a simple matter, at about one and a half cents per pound over the original cost, which leaves a good margin for profit. The ordinary farmer had better sell at home, either to the local butcher or the exporter.

**Finishing
Steers.**

**Selling
Steers.**

The allowance for shrinkage, when weighed full, is from four to five per cent., according to the quality of the animal. Four per cent. is sufficient for a well-finished steer or heifer. Cattle that have received no supper or breakfast, and are weighed about eight or nine o'clock in the morning, in the stable, will require no further allowance. If fed in the morning, and driven four or five miles to weigh, no shrinkage allowance should be made.

**Shrinkage
to Allow.**

SECTION IV.

HORSE BREEDING.

Two Objects.

In breeding horses the farmer should have two objects in view, viz., breeding for his own use, and for the market. My opinion is that he should confine himself to the two following breeds: First, the modern Clydesdale (see Ill. 113), which is a smooth animal and of general good quality.

Modern Clydesdale.

GENERAL CONFORMATION.

General Conformation.

Head—Ear clean and pointed, forehead broad, eye prominent and mild, neck well arched with a good, full mane.

Wither—Prominent; back straight and short.

Croup—Not too drooping; tail, well carried and full haired.

Chest—Breast broad, ribs long and well sprung.

Shoulder—Moderately upright and well muscled.

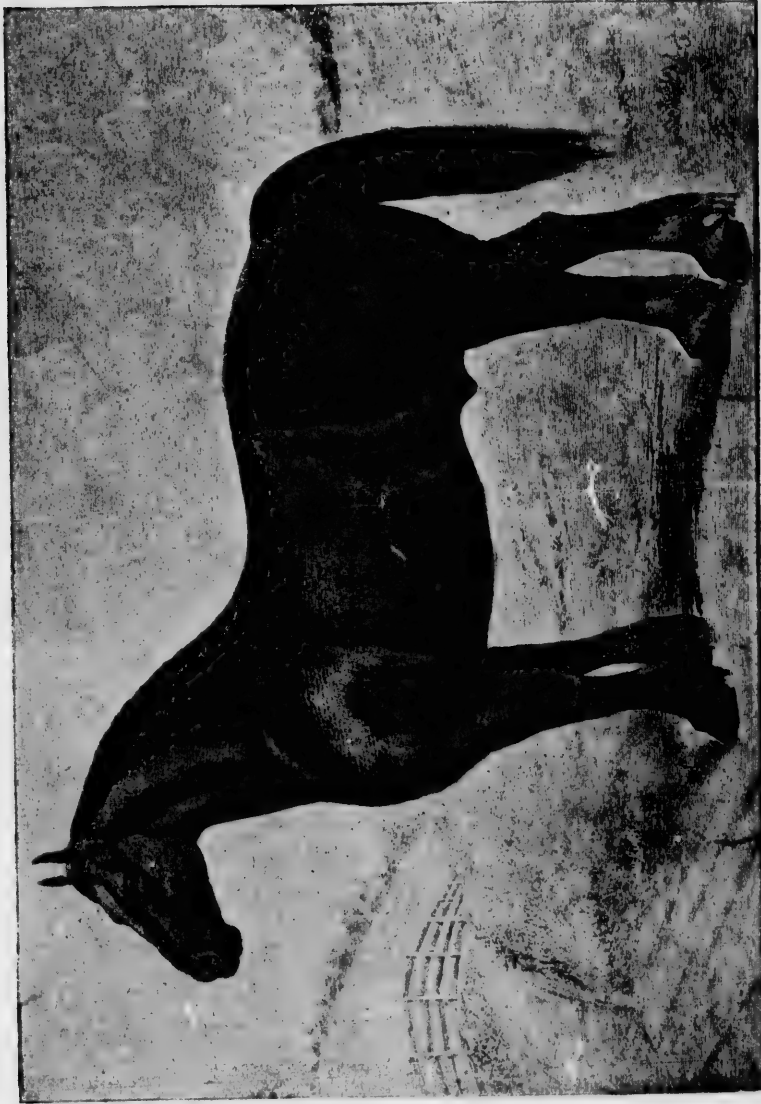
Elbow—Strong and muscular.

Knee to Foot—Cannon bone flat, tendons prominent, skin lying close to bone, light feather of silky hair; pastern clean, not upright.

Hock—Strong and wedge shape, posterior straight, free from puffiness.

Hock to Foot—Cannon bone flat, skin lying close to bone, light feather of silky hair; pasterns clean, not upright. Avoid large fleshy legs and pasterns covered with coarse hair.

Foot—Strong, tolerably round, concave sole, frog prominent.



113. CLYDESDALE HORSE.

Color—Bay or brown, usually white hind feet, and stripe on face.

Skin—Soft and mellow.

Temperament—Docile but energetic, not nervous.

Style and Action—General appearance attractive.

Action—Free ; walking action must be specially good.

Weight—Fifteen to sixteen hundred pounds.

Height—Sixteen to sixteen and a half hands.

**Pedigree
Mares.**

There is an advantage in starting with pedigreed mares, so that their line of breeding may be traced back for several generations. If there should be a strain of the fleshy, coarse legged type, have nothing to do with them. You might as well use grade mares whose breeding you know nothing about. Be particular and use only a pure-bred sire whose ancestors are of the smooth type, and that he himself is quality from the feet up.

**Grade
Mares.**

**Cleveland
Bay or
English
Coach
Horse.**

The second style of horse suitable for the farmer is the Cleveland Bay, or English Coach Horse. (See Ill. 114). This is a most useful general purpose animal for the farmer, and for the market; at the present time there is more demand for heavy coach horses than for any other type.

**Demand for
Coach
Horses.**

**Breed Right
Type.**

In selecting brood mares give the preference to the pure breed, other things being equal. Select large and stylish ones, with good knee action. Use only a pure-bred stallion whose



114. ENGLISH COACH HORSE.

line of breeding is of the right type, one full of quality and knee action. Many are inclined to use a thoroughbred racing sire, which is a mistake, as they lack knee action, having been bred for running. A "Hackney sire" might give knee action, but they are too small, and are usually dish faced, which is not desirable in a coach horse.

Confor-
mation of
Coach
Horse.

The following is the general conformation of a coach horse:

Head—Ears, fine, and approaching each other at tips when pointed forward—forehead broad, eye prominent, nostrils large.

Neck—Long; head gracefully attached and carried well up; crest well developed and nicely arched.

Withers—Well developed.

Back—Straight and short.

Loins—Broad and strong.

Croup—Only moderately sloping.

Tail—Coming out high up and full haired, carried straight and well out from the body.

Chest—Ribs long and well sprung.

Breast—Full.

Shoulder—Sloping; "Forearm," strong.

Knee to Foot—Cannon bone broad and flat, skin lying close to bone and tendons, free from long hair, pasterns strong and oblique.

Foot—Medium size and tolerably round.

Sole—Concave.

Frog—Well developed.

Hock—Large and strong, posterior straight, absence of coarseness and puffiness.

Hock to Foot—Hind cannons clean, broader and flatter than the fore ones, skin lying close to bone and tendons, absence of long hair, pasterns strong, medium length and oblique.

Foot—Smaller and more concave than the front ones.

Color—Bay or brown with dark legs; skin, mellow.

Temperament — Energetic, docile, free from nervousness.

Style and Action—Free and elastic, attractive, good knee action, stride long.

Weight—Weight thirteen to fourteen hundred pounds.

Height—Sixteen to sixteen and a half hands.

For heavy dray work, the English shire is the most popular horse. In Liverpool and London it is quite common to see three of those monster animals, each weighing over a ton, hitched "tandem" to a large dray.

The "mongrel" or cross-bred horse is usually a disappointment. The Hackneys and Roadsters are fancy animals, but are too small for the farmer. The thoroughbred race horse and trotting horse are for the "sport," and have no place on the farm.

English
Shire.

Monster
Animals.

Hackneys
Roadsters.

SECTION V.

CARE AND FEEDING OF COLTS.

**Rearing
Colts.**

For the first two weeks after foaling the dam should not be worked, and for some time after that only moderately, and then she should not be allowed to get overheated. When at work the foal is better kept in a roomy box stall. In addition to the mare's milk, the foal might get two feeds each day of cow's skim milk, fresh, with a little ground flaxseed added. As soon as it commences to eat feed it grass with a little bran and crushed oats. In winter feed cut clover, pulped roots (either carrots, sugar beets or turnips), silage and bran mixed, morning and evening, and for noon whole roots only. With kind treatment and a comfortable and roomy place for exercise, the colt should develop its frame and muscles at an early age. Avoid fattening food as this is liable to produce disease and stunted development in all young animals.

Feeding.**Kind
Treatment.****Avoid
Fattening
Food.****Winter Feed
for Farm
Horses.**

For winter rations for farm horses that are only working moderately, give cut clover hay and silage, mixed a few hours previous to feeding. Feed morning and evening, all that they will eat in an hour, with two pounds of crushed oats and one pound of bran added at each feed. At noon give three pounds of the cut clover and silage mixture, and fifteen pounds of whole roots.

For summer ration when working hard, give cut clover and silage mixed, all they will eat in an hour, three times each day, with four pounds of crushed oats and one pound of bran added. Water both before and after feeding. Clover hay is a flesh former, and is specially suitable for horses that are working hard, but it must be properly cured, and must not be musty.

Summer
Ration.

Watering
Horses.

It is advisable to moisten the feed with silage, pulped roots or lime water. Hay cut in cutting box, should be cut long for horses, to prevent irritation of the stomach.

Moisten
Feed.

SECTION VI.

VARIOUS BREEDS OF SHEEP.

This country is specially adapted for sheep raising. On account of the clear and dry atmosphere, sheep are not subject to the diseases that are prevalent in those countries where the atmosphere is more humid and damp.

This
Country
Favorable
for Sheep.

There are breeds to select from which are suited to the various circumstances and conditions. The farmer must decide this question for himself. If he is prepared to give his flock the necessary care and attention, the chances are that one of the long wool breeds will be most profitable, but he must be prepared to house them in rainy weather, or their wool, which is long and open, will hang on them like a wet blanket, which is very injurious. The

Select
According to
Conditions.

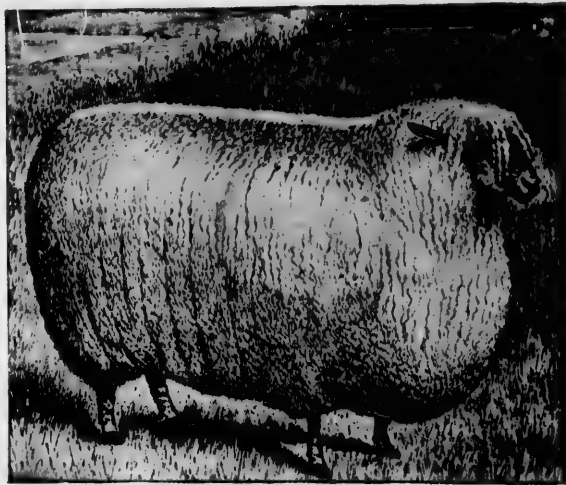
Special Care
for Long
Wool.

**Cotswold
Described.**

largest of the long wool breeds is the Cotswold. (See Ill. 115). They are well proportioned and lay on flesh evenly. They have a prominent crest of long wool on the head, and are well covered below. An ordinary flock of Cotswolds will yield an annual average clip of wool of from thirteen to fourteen pounds each.

**Lincoln
Described.**

The next in order is the Lincoln. (See Ill. 116). This is a more compact animal. The

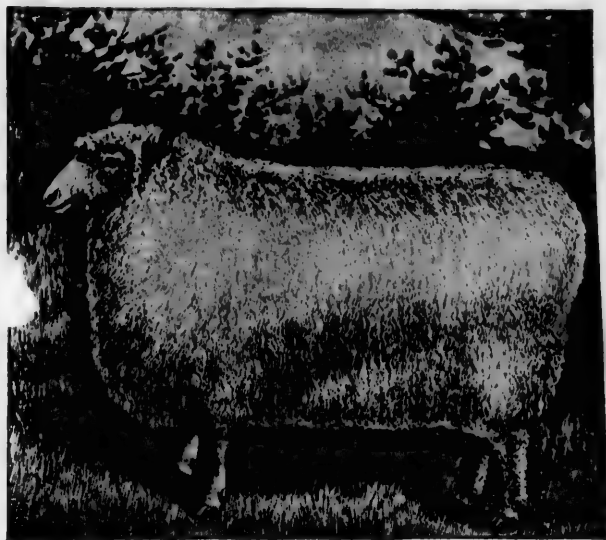


115. COTSWOLD.

body is evenly covered with flesh and long curly wool. There is a small crest on the head. The annual yield of wool is equal to that of the Cotswold. The other long wool breed is the Border Leicester. (See Ill. 117). This is an attractive, upstanding and lengthy animal with clean head and legs, and wool usually in ringlets.

**Leicester
Described.**

One objection to these animals is that they are liable to get bare below at an early age. They are noted for a good covering of flesh on the back, ribs, and hind quarters, which are the most pensive meat cuts. Their average clip of wool is about two pounds less than that of the Cotswold and Lincoln breeds. The English or



116. LINCOLN.

blue face Leicester is more blocky with a heavier fleece, and is better covered below.

The Downs, or fine wool breeds, will endure exposure to rains and damp weather better than the long wool breeds on account of their fleeces being more dense.

The Oxford Down (see Ill. 118) is a heavy, compact sheep, with medium wool, and with a

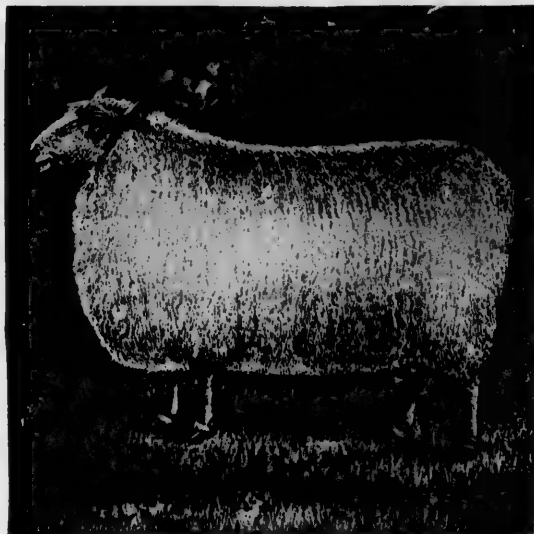
The Down
Breeds.

Oxford
Down
Described.

crest on the head, a brown face and brown legs. This and the other Downs are noted for a superior quality of mutton. The average weight of wool from a flock is from eight to nine pounds each.

**Shropshire
Described.**

The next in order of the fine wool breeds is the Shropshire. (See Ill. 119). This is a very



117. BORDER LEICESTER.

compact animal full of quality, both in flesh and wool. The wool is of a fine silky texture with which the entire body is covered. The face and legs are dark. The average weight of fleece is from eight to nine pounds each.

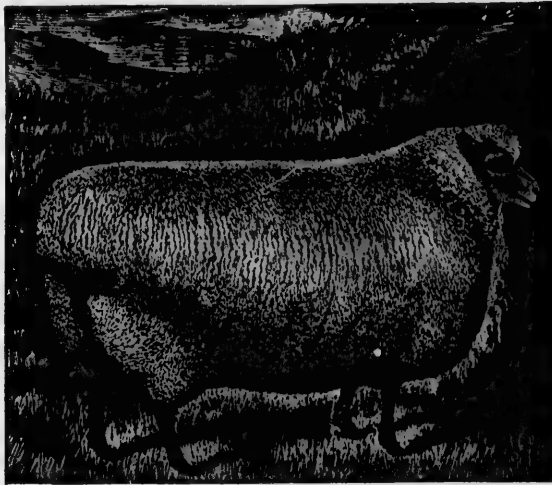
**South-Down
Described.**

The most compact and hardy of all the breeds is the South-Down. (See Ill. 120). This is a smaller animal than the other breeds, but

the deficiency in size is made up in quality both of flesh and wool, which are superior to those of any of the other breeds. The average weight of fleece is from seven to eight pounds.

There are other varieties as the Dorset, Hampshire, Suffolk, and other breeds, each having their special characteristics. For the first it is claimed they will raise two crops of lambs

Other
Breeds.



118. OXFORD-DOWN.

per year, but this is not practicable. Again, having horns they are said to be able to take care of themselves against dogs. For that annoyance, *lead* is more effectual, and every farmer who has a valuable flock of sheep, should keep a loaded gun in a convenient place, and when he finds a dog chasing his sheep he should shoot it, bury it, and keep his mouth shut.

Shoot
Dogs.

**Feeding
Breeding
Ewes.**

**Rape for
Feed.**

**Early
Lambs.**

The feeding and exercise of breeding ewes requires special attention. In the autumn when being mated, they should receive extra feed; nothing is better than a feed of rape each day. It is advisable to have lambs come early in the spring, provided the ewes have a warm pen. The lambs should have a compartment in the pen, arranged so that the ewes cannot get in,



119. SHROPSHIRE.

and where they can receive extra mixed feed of pulped roots, cut clover, bran, bruised oats and ground flaxseed.

**Weaning
Lambs.**

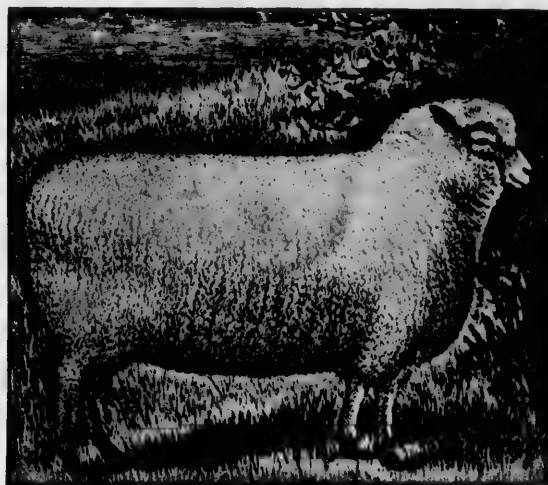
The lambs should be docked when a week old. Have some early rape ready for them by the middle of July (weaning time) so as to keep them growing and develop a strong, healthy

frame. Soon after lambing the ewes should be shorn, and both the ewes and lambs dipped with one of the commercial dips, following printed directions. Ewes and lambs should also be dipped in the autumn.

Dipping
Sheep.

In winter sheep require a dry and thoroughly ventilated building, which is not too warm, but free from draughts. Not too many sheep should

Winter
Care.



120. SOUTH-DOWN.

be in a pen. (For this see plan of sheep house, Ill. 101). The breeding ewes should have daily exercise, either in a yard or field.

Feed morning and evening the following mixture, prepared a few hours before feeding: Cut clover, salted, pulped turnips, silage and a little bran. The quantity fed should be what they will eat in an hour. Noon ration, pea

Feeding
Sheep.

Winter
Feeding of
Lambs.

straw or clover hay, fed outside in racks constructed as per diagram. (See Ill. 102). For those farmers who prefer not to breed sheep, but follow the system of winter feeding, I would suggest the following: Buy a sufficient number of wether and ewe lambs to fill the sheep house. In the autumn, for the first two months, feed according to the above directions given for breeding ewes. Then for finishing, add to the mixture a little chopped grain, peas, barley, and oats. The writer found this method very profitable. On no account buy old sheep to feed, unless it is for soap grease.

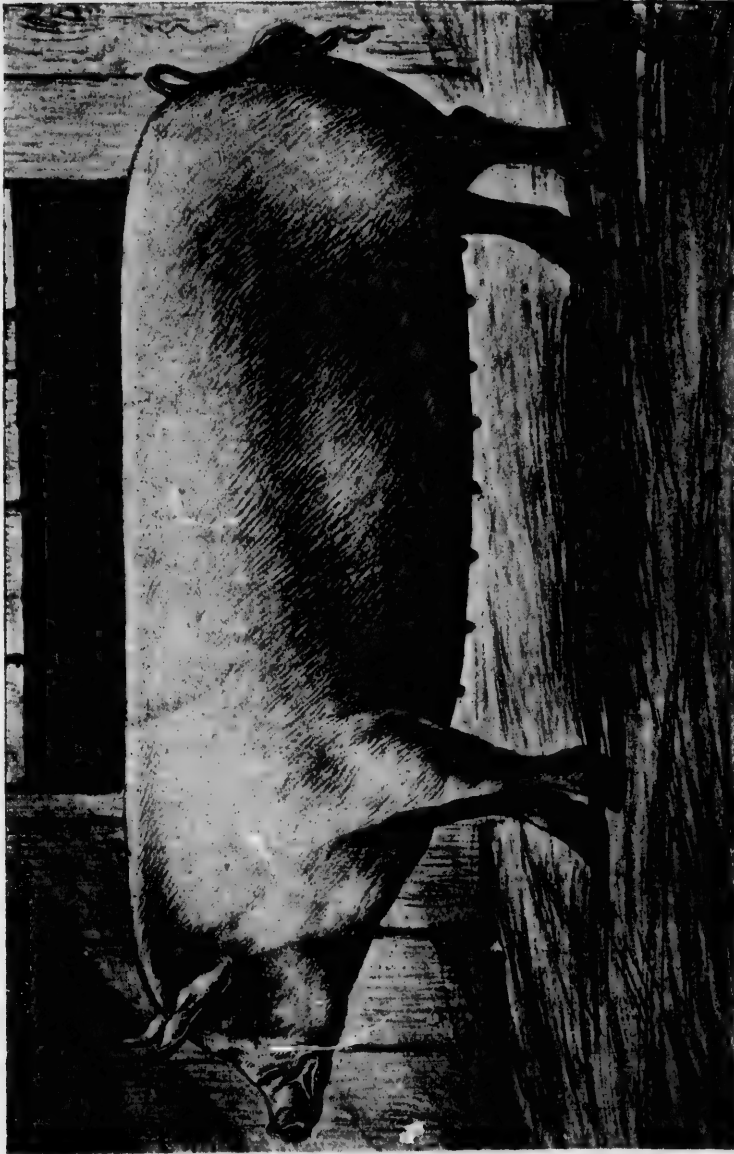
SECTION VII.

SWINE.

Breeds
Required
for the
Trade.

Change of
Type.

During recent years all the popular breeds of swine have had to undergo a change, to suit the present demands of the trade, which calls for juicy flesh instead of fat. The big fat hog, that was so popular some years ago, has had to give way to one of an entirely different type (see Ill. 121), one with longer body and hams, for the most expensive cuts (see Ill. 122), and greater depth of body and less width on back. (See Ill. 123). It should carry its width evenly from shoulder to tail, with light shoulder and gowl, as these are cheap cuts. This change of conformation was first brought about by a desire to cater to the trade of Great Britain,



121. TYPICAL BACON EGG (SIDE VIEW).

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Britain,

The Fleshy Hog.

which demands pork of a fleshy and better quality. Our home trade is also undergoing a change in the same direction. The fat pork, that was so popular some years ago, is no longer wanted. The fat on the back must not exceed one and a half inches in thickness. What is wanted is a fleshy hog, about eight months old, and rather under than over two hundred pounds. While great progress is being made in the change of type, still, so far none of our present breeds of swine conform exactly to the ideal aimed at. To fix a type will take years to accomplish, even by our most expert breeders, and whether this will be by cross breeding or through one of our present pure breeds is difficult to say.

Years to Fix a Type.**Feeding Swine.****Feed for Young Pigs.**

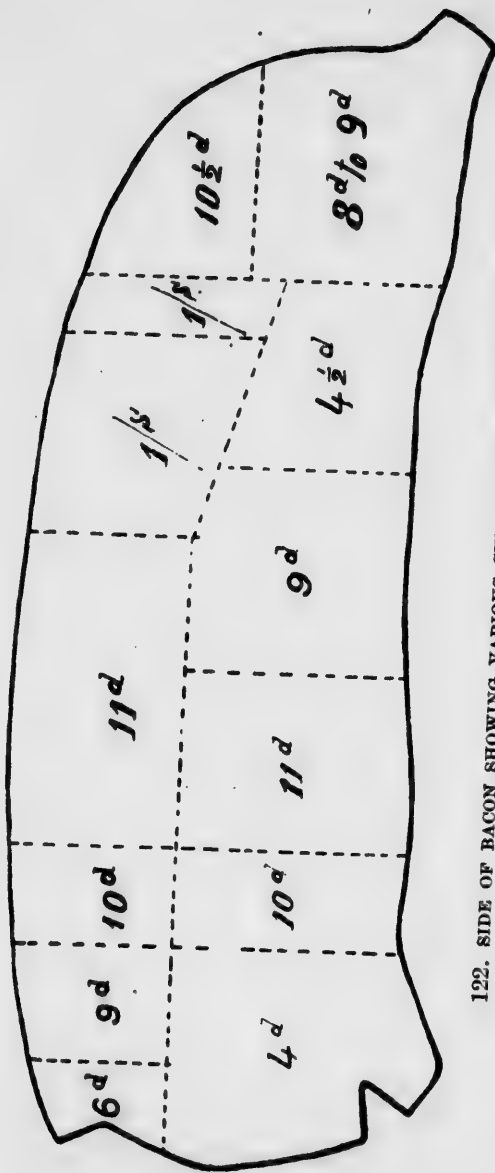
Even after we have got the typical hog, the work is only half done. The compounding and preparing of foods to produce the best quality of flesh is yet in the experimental stage, and will evidently take some time before the results will be entirely reliable, so as to produce a uniform good quality of flesh. According to experiments one thing has been fully demonstrated. In order to keep young pigs growing, after being weaned, they should be given a certain quantity of skim milk, along with other feed, which at first should be composed largely of middlings with a little ground flaxseed. When about three months old add bran, pulped roots, and green clover or rape, and a little

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SWINE.

249



122. SIDE OF BACON SHOWING VARIOUS CUTS AND THE AVERAGE PRICES
REALIZED IN ENGLAND DURING 1897.

**Feed for
Finishing.**

ground grain, peas, barley, and oats, mixed. In winter clover should be cut and scalded. Mix the whole together, and feed a limited quantity, morning, noon and evening. When the pigs are five or six months old increase the grain, and feed less of the bulky food, and for the last six weeks in finishing the morning and evening rations may be largely of chopped grain. Do not give more than they will consume in one hour and a half. At noon feed sugar beets or mangel wurzels raw, without grain. This system of feeding keeps the pigs in a healthy and growing condition, and makes a juicy quality of flesh.

**Salt and
Ashes.**

During the winter when housed they require old sods, also salt and hardwood ashes. With proper care and feeding, no animal on the farm will give such quick returns and large profits as the pig. This is the friend that has so often been depended upon to pay the rent.

Brood Sow.

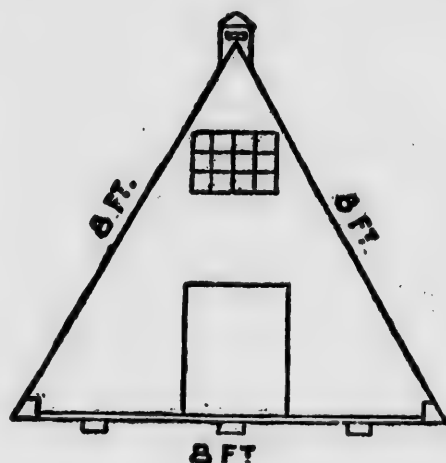
To get the best results from a brood sow, she should receive kind treatment so that she will be gentle and kind. This has a very great influence on her offspring. With proper care she will have two litters per year, rearing on the average from seven to ten pigs each time. As this means a heavy drain on the system of the sow, she will require to be fed accordingly. In winter, feed skim milk, bran, pulped roots and chopped grain (mixed) morning and evening, and at noon, sugar beets only. Exercise is

**Winter
Food for
Swine.**



123. TYPICAL BACON HOG (FRONT VIEW).

necessary, but she should not be turned out of doors in cold weather and allowed to get chilled. As a substitute for skim milk, fill a barrel or milk can with hot water, stir in a little middlings and chopped grain, and cover over for a few hours. Pigs, both young and old, should have in addition all the pure water they wish to drink.



124. PORTABLE PIG HOUSE.

Summer
Food for
Swine.

In summer, young growing pigs should have the run of a clover patch, but when finishing for market, keep them in the house where they will be comfortable and clean.

Portable
Pig Houses.

The brood sow should also have the run of a clover patch in summer. A small portion of the clover field may be hurdled off, and a portable pig house (see Ill. 124) constructed to shelter the animals from the hot sun and storms.

Each brood sow should have a separate enclosure and a portable house in which to rear her young in summer.

The same style of house may be used for the young pigs during the summer. In order to get the best results, it is necessary to provide shelter in the clover or rape pasture during the summer season. A pair of horses will haul the portable "pig house" wherever required.

SECTION VIII.

POULTRY.

Poultry is kept on most farms, but, as a rule, it receives very indifferent treatment. Seldom have the fowls a house to protect them from the storms and cold weather, and are allowed to roost out of doors on implements, fences, trees, etc., in all kinds of weather. When a house is built for them, it is frequently quite unsuitable for their health and comfort, so that the results are not satisfactory.

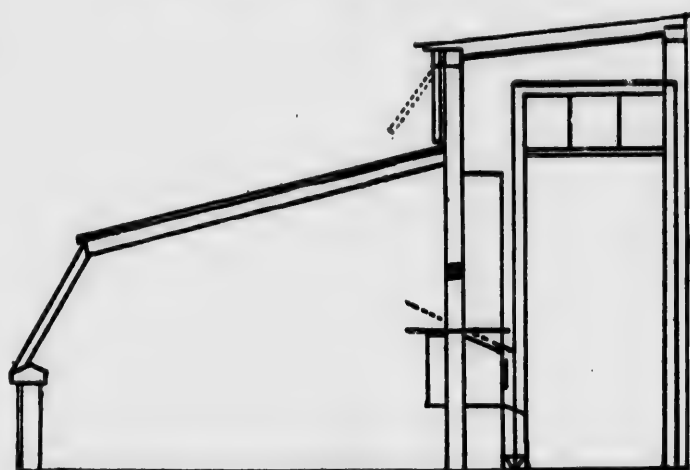
How
Poultry is
often kept.

For plan of hen house with modern conveniences see page 186 and end view illustration 125 showing position of nest, roost, and feed trough. This is on the south side of the implement house, and isolated from the cattle stables, which is desirable. The size of building here drawn is twelve feet wide by fifty-two feet long. This can be made shorter or longer according to the requirements.

Plan of
Suitable
Poultry
House.

Specifi-
cations.

There is a passage of three feet on the north side. The balance is divided, with wire netting, into six compartments, which are eight and a half feet square. These are of ample size for ten or twelve hens each. The roof over the passage is eight and a half feet high with a fall of six inches. This is covered with inch boards, tar paper and shingles. The main roof is six



125. POULTRY HOUSE—END VIEW.

feet high next the passage, and is covered with inch boards, tar paper and shingles. The south side is two feet high, sheathed on the outside with tar paper and boards. From the top of this lower wall, to the main roof, is glass, at such an angle that in winter when the sun is low it will shine into the pen, covering about two-thirds of the space, and in summer when the

sun is high, about one-third. (See page 184). The inside of the poultry house, including sides, ends and roof, should be lathed and plastered. Whitewash the inside of the poultry house every spring, and the glass as well, so as to moderate the sunlight in summer. This should be washed



126. INCUBATOR.

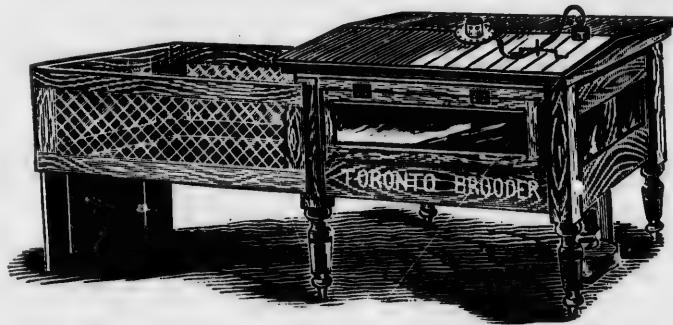
off the glass in autumn. The feed trough is placed in the passage, and provided with round uprights, two inches apart, or sufficient for the fowls to put their heads between to feed. They may be watered in the same way. Nests, roosts, and board for droppings should all be

Feed and
Water
Trough.

moveable. The latter can be made to tilt into a box or wheelbarrow in the passage.

Heating the
Poultry
House.

While every precaution has been taken to make the poultry house frost proof, yet it may be necessary to provide artificial heat in very cold weather. This may be done by placing a small furnace or stove in a recess on the north side of passage, and from this have a six inch, hot air, tin pipe extending about two-thirds of the length of the building, and open at the



127. NURSERY BROODER.

ends, which will keep the building both dry and warm during the coldest weather. This is essential that you may have early chicks, say in February or the beginning of March. These will commence to lay when eight months old, say at the beginning of November, and continue laying all winter, or during a time when fresh eggs are worth three times as much as in summer. In a flock of fifty or sixty hens the difference amounts to considerable. The object should be

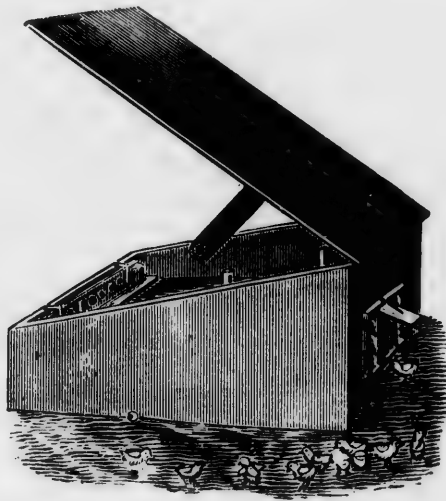
Early
Chicks.

Winter
Eggs.

to raise chicks for winter laying instead of summer.

Arrange to keep the pullets for two winters, and with proper care and feeding they will be in good condition for table use in the months of May and June, after their second winter laying. At this season of the year poultry brings a high price. The male chicks should be fattened and

Disposing
of Poultry.



128. OUTDOOR BROODER.

sold for broilers when four or five months old. At first feed bread crumbs or rolled oats, then ground corn, peas, barley and oats, mixed with skim milk. Also give ground bone and flesh with green vegetables or roots. When fattening, confine to a small pen without exercise. Furnish all the grit and pure water they wish. Give all the feed they will eat, and keep them free

How to Feed

from vermin by using some insecticide or kerosene. With proper care it will not be necessary to use the cramming machine in finishing.

**Care of
Hens when
Laying.**

To get the best results from hens in producing eggs, induce them to take plenty of exercise by scattering their food, composed of corn, peas, barley, oats and wheat, among chaff, so that they will have to scratch for it. In addition they should receive a liberal ration of cut clover, ground bone and flesh, also middlings, mixed with skim milk, and all the vegetables they wish, such as cabbage, lettuce, sugar beets, etc., also grit and pure water. The

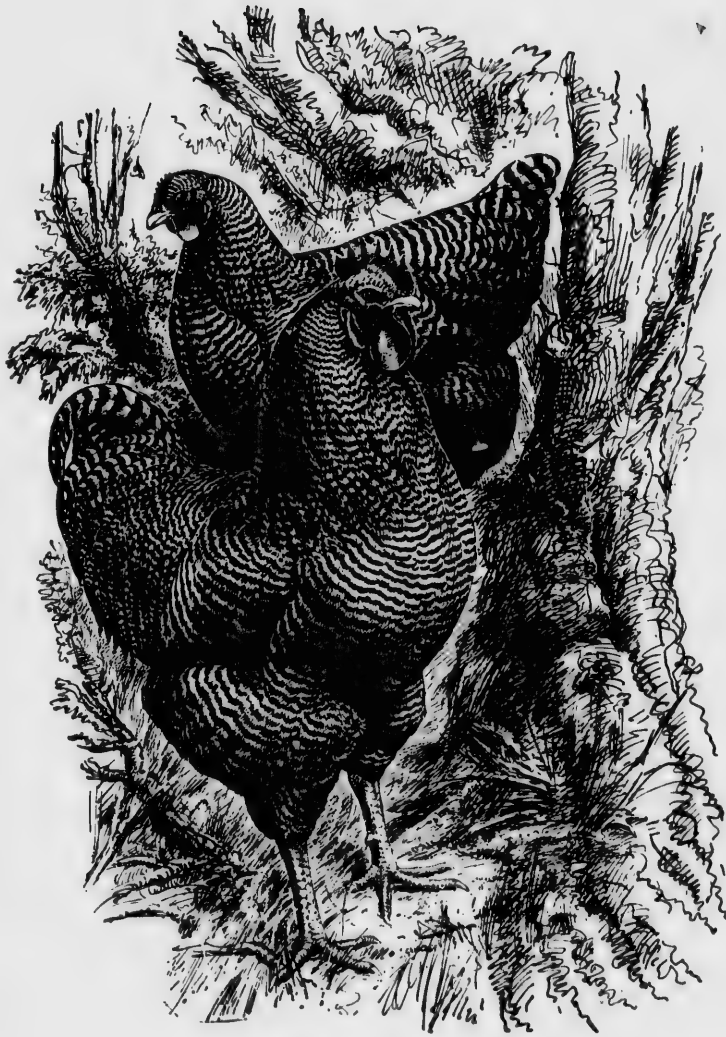
Dust Bath.

floor of the southern portion of the pen should be covered with fine gravel and sand for the fowls to take a regular dust bath, which is necessary to keep them clean. In summer the hens should have the run of a paddock of green sward, enclosed with a woven wire fence. This may be planted with groups of evergreen and deciduous trees for shelter from the hot sun in summer. In the plan (see page 32) provision is made so that the portion of lawn between the house and hennerly, nearly an acre, may be enclosed for this purpose. Digging underneath the trees will help their growth, and make dust baths for the fowls.

**Trees for
Shelter.**

**When to
Mate.**

The hens selected for breeding purposes should be mated about ten days before eggs are wanted for hatching. After the breeding season



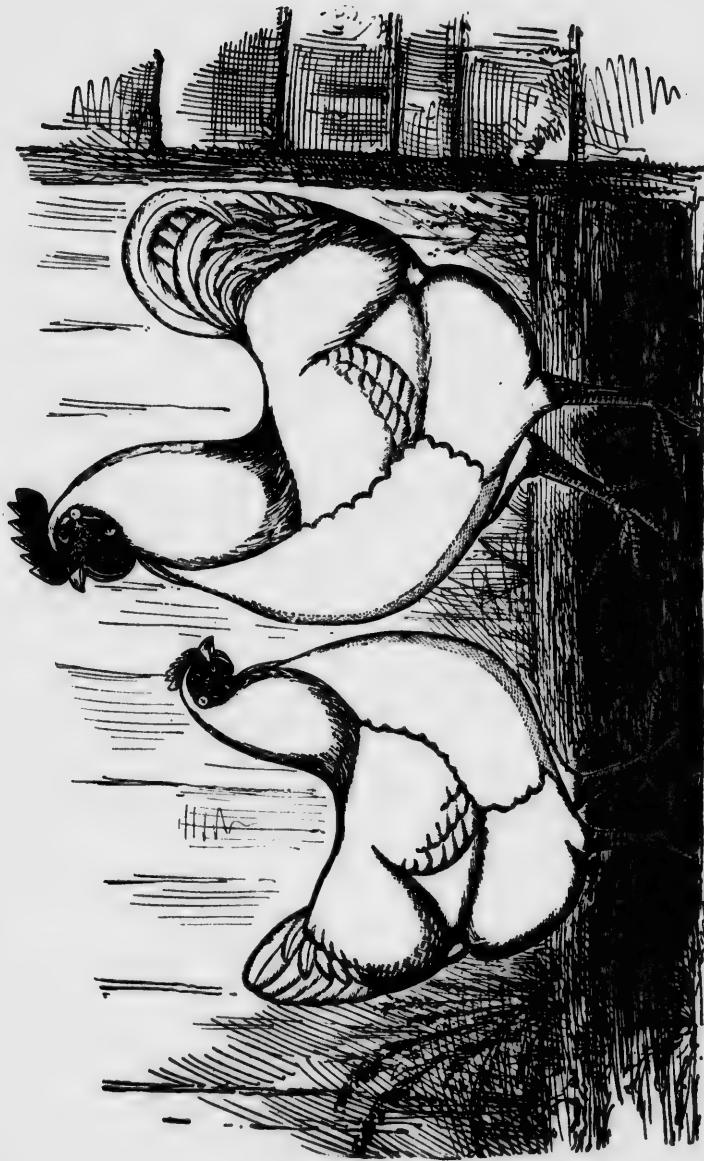
120. BARRED PLYMOUTH ROCKS.

**Separate
Male Birds.****Setting
Hens.****Poultry a
Specialty.****Advantage
of Brooder.****Breeds of
Poultry.**

is over, either kill the male bird or keep him by himself. According to experiments hens lay more eggs which have a superior flavor, and better keeping qualities when the male bird is kept away from them. Hens should be set in a secluded place. Food and fresh water should be constantly within their reach. In preparing a nest, first put in the bottom a thin sod, and over this a sheet of tar paper. This will keep away lice; then some chaff is all that is necessary. When only a few fowls are kept, nothing more is required than an old hen to do the hatching and caring for young chicks. When poultry is made one of the special departments of the farm, and kept with a view to making money, the incubator (see Ill. 126) has advantages over the hen, viz., if a hundred eggs are ready for setting, beginning of February, it might be difficult to get the necessary number of broody hens at that season, whereas the incubator can be got ready in a few minutes, and the hatching done quite satisfactorily. The manufacturers furnish printed instructions with each machine.

The first two weeks is the most critical period in rearing chicks. The self regulating nursery brooder (see Ill. 127) is particularly valuable for this purpose. For summer a simple outdoor brooder (see Ill. 128) may be used.

There is a long list of distinct breeds of poultry, each having its own special peculiarity and advantage. The following breeds are



130. WHITE PLYMOUTH ROCKS.

**Egg
Producers.**

specially noted as egg producers: Andalusians, Minorcas, Spanish, Leghorns, Houdans, Dominiques and several of the Game breeds. The above breeds are of various forms and colors.

**Table
Breeds.**

For table use the Brahmas and Cochins are particularly suitable.

**General
Purpose
Breeds.**

For general purpose, first, we had the old English Dorking. This has been superseded by the barred Plymouth Rocks (see Ill. 129), an American breed which has become very popular throughout the country. It is especially adapted for early maturing for table use, and as winter layers they are one of the best.

**Plymouth
Rocks.**

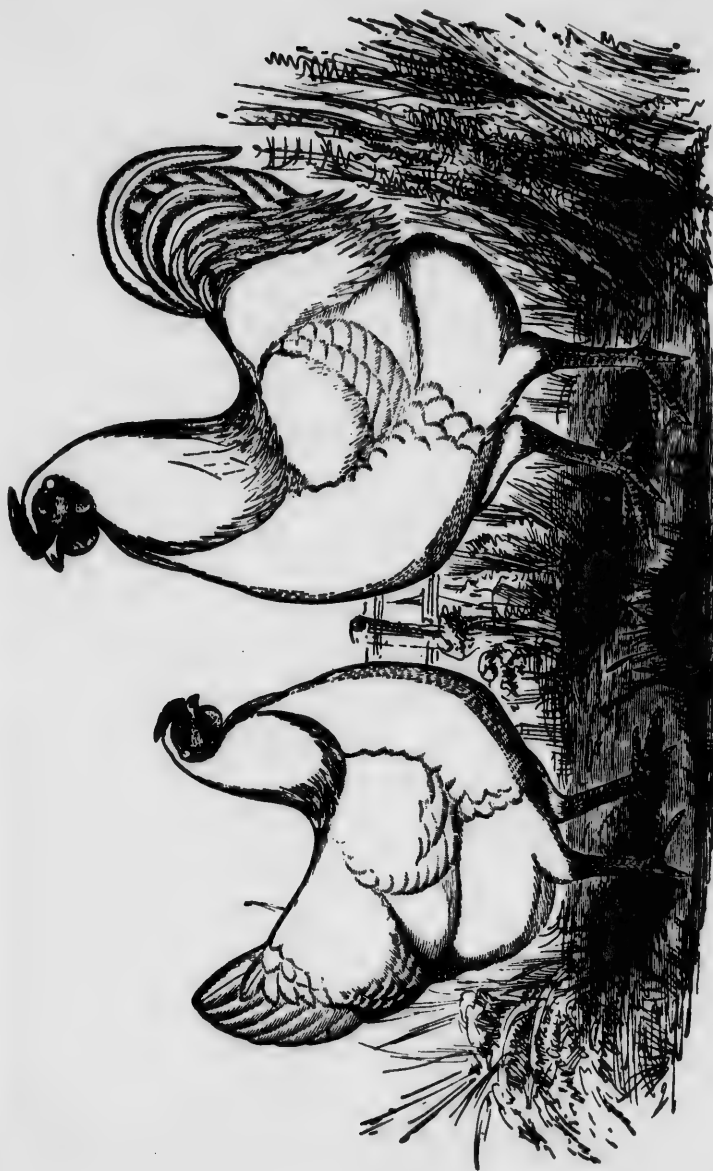
The White Plymouth Rock (see Ill. 130) has all the good qualities of the barred variety, with this additional, that it is more attractive when dressed for the British market, consequently is being preferred. There is also a new buff colored Plymouth Rock which may become popular. The White Wyandotte (see Ill. 131) is

Wyandottes

a still newer breed than the Plymouth Rock, and is quite equal as a general purpose fowl. For young broilers they put on flesh very rapidly, and being white, have the desirable clean and tidy appearance when dressed. They

Rose-Comb.

have a rose comb, which is preferable to a single one, as it is not so liable to get frosted. This breed is also one of the best winter layers. The new buff colored Wyandotte (see Ill. 132) is very attractive, and likely to become popular when they can be bought at moderate prices.



131. WHITE WYANDOTTES.

Management of Ducks.**Pekin Variety.****Aylesbury Duck.****Housing Ducks.****Lawn for Exercise.****Hens vs. Incubator.****How to Water and Feed.****Skim Milk for Ducks.**

With proper management no branch of the poultry business will give larger and quicker returns than duck raising. The "Pekin" variety (see Ill. 133) is recommended very highly. The "Aylesbury," a pure white duck, has many admirers. The "Pekin" is of a creamy white color. These ducks will lay over one hundred eggs each in a season. For breeding put one male with five or six ducks first of December. Do not set the first ten or twelve eggs. A portion of the poultry house (see page 184) is suitable for ducks, except that the roosts are not necessary. Instead, keep the floor of the pen covered with clean litter, either of cut straw or chaff. Ducks require only about half the space hens do. They should have a portion of the lawn or paddock for a run for exercise, the same as hens, but should be kept separated from other fowls by a woven wire fence. The eggs may be hatched under hens or with an incubator. The care and feed of ducklings is the same as described for chicks. They should have all the fresh water they wish to drink, but the trough should be protected by uprights, so that they can only get their heads between to drink. It is not necessary that they should get into it with their feet. They should be supplied with an abundance of green feed and grit.

Grain fed to ducks, old or young, should be ground and mixed with skim milk. Aim to have as many early ducklings as possible as



132. BUFF WYANDOTTE.

**Time to
Market.**

**How to
Finish**

these will command the highest price. They should be ready for market when between nine and ten weeks old, weighing at that time from four to five pounds each. In finishing ducklings for the market it is advisable to give one feed each day of "celery" during the last week. This imparts a pleasant flavor to the flesh.

In connection with a home dairy where a supply of skim milk is available, the poultry department of the farm should be very profitable. Milk is important for the fattening of chicks and ducklings.

**Geese a
Specialty**

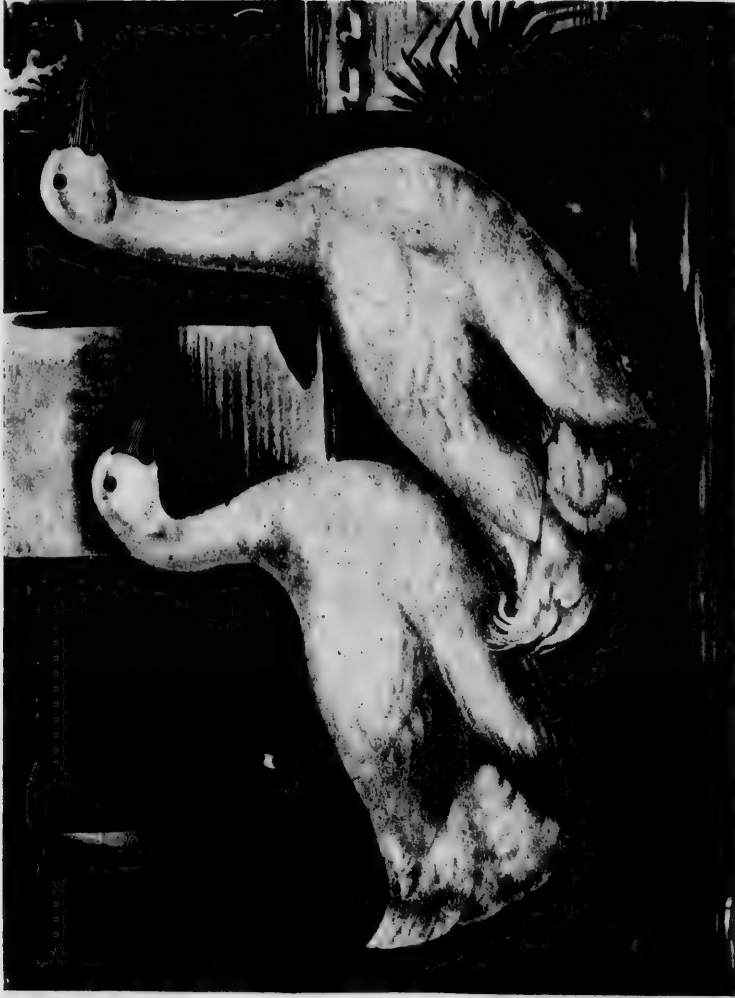
The individual farmer must decide whether geese should also be kept. Under certain conditions they may be made profitable, and that would be as a specialty. However, it may be said that, for the best results, every department of the farm should be made a specialty.

**Breeds of
Geese.**

The favorite breeds of geese are the "Toulouse," a large gray, and the "Emden," a large white. A young goose will lay about twenty eggs in a season, and an old goose from thirty to thirty-five. In mating put two or three geese with one gander. Geese do not thrive in close confinement. They require at least the freedom of a pasture field. The eggs hatch in thirty days. The goslings require the same treatment and feed as ducklings. It is not necessary that they should have water in which to swim, but they should have at all times a supply of fresh water to drink. It is advisable

**Require
Freedom.**

**Fresh
Water.**



133. PEKIN DUCKS.

**When to
Sell.**

to rush the goslings and sell them as soon as well feathered, say when they are two and a half months old. They should then weigh from twelve to fifteen pounds each. This is the most profitable time to sell.

The Turkey.

A Monarch.

Varieties.

**Allow
Freedom.**

**How to
Feed.**

Mating.

**Young
Turkeys.**

**When to
Sell.**

It is a common expression at Farmers' Institute meetings to "leave the big gun for the last," so the "Turkey" is left to the last in this work. Of all fowl this is the most noble. "He is monarch of all he surveys," and that includes the whole neighborhood. The "Bronze" variety is the largest and most popular. The "White Holland" has also many admirers. A shelter should be provided for the turkeys in the winter, but it must be roomy, and the roosts from eight to ten feet high. They will not thrive when closely confined. As the turkey hens are not expected to lay until the end of March or the first of April they should have plenty of exercise during the winter. Feed a little grain, peas, barley and oats, mixed. In addition give cut clover, moistened, and roots. A well known institute speaker advocates silage for fowls, and all other animals on the farm.

In mating put about a dozen of hens with one male. The young turkeys are rather difficult to raise at first, but with a warm coop or brooder, having a small pen attached, there need be no loss. Turkeys hatched in June should weigh from twenty to twenty-five pounds for Thanksgiving and Christmas.

CHAPTER V.

SECTION I.

BOOKKEEPING ON THE FARM.

To be successful it is necessary that every farmer should keep a systematic record of his affairs. The most convenient books for this purpose are an ordinary Daily Journal and a small Ledger.

Book-
keeping
Necessary.

The original book of entry should be the Daily Journal, in which, at the close of each day, should be entered, in plain statements, a brief record of the day's transactions; such as hiring of help, threshing, buying and selling, etc., being careful to enter such necessary details as the date, name of person with whom business is done, the thing received or given, price, quantity, quality, etc., and terms of sale or purchase, and of payment. Note prevailing weather also.

Daily
Journal.

Each entry in this Journal should be disposed of, when time permits, by a further entry, wherever necessary, either (A) in the Daily Journal, (B) Cash Book (see cash book, as found in end of Daily Journal), or (C) in the Ledger.

Entries
Disposed of.

(A) If a transaction is to be completed, or a note paid to you, or by you, at some future date, turn to specified date in Daily Journal, and

* DAILY JOURNAL ILLUSTRATED.

MONDAY	APRIL 17	1899
Light rain during night. Morning cloudy, then clear and warm.		
Sold 3 head of cattle to H. Miller as per agreement of 2nd inst. Rec'd in full settlement, cash \$50, Note due June 30th, \$50		
✓	Ordered from W. Smith, one 6 foot self-binder to be delivered June 30th, and settled for then by cash \$25, and Note due Nov. 1st for balance \$100	100 00
✓	Sold T. Moore on account, 100 lbs. butter @ 20c.	125 00
✓	Sold Jas. Hamilton on account 50 bush. Wild Goose wheat @ 75c.	20 00
	Commenced sowing spring wheat. Wild Goose variety.	37 50
FRIDAY	JUNE 30	1899
Warm during night. Day hot and fine. Light rain toward evening.		
Memo from April 17th; W. Smith to deliver binder to-day.		
" " " H. Miller's Note my favor due to-day at—		
✓	Took delivery of binder from W. Smith, and settled for same by cash \$25 and Note due Nov. 1st for \$100, as arranged	50 00
✓	Paid T. Moore balance in full of acc't to date	125 00
✓	Rec'd from H. Miller cash in full for Note due to-day	33 70
✓	Rec'd from Jas. Hamilton bal. in full of acc't	50 00
	Hauling hay to barn, 22 loads, 16½ tons.	31 75
WEDNESDAY	NOVEMBER 1	1899
Light frost during night. Day fine and rather cold.		
Memo. from June 30th; Note favor — account binder due to-day at — Bank in —		
✓	Paid Note acc't binder due to-day by cheque on Dom. Bank	100 00
	Harvesting and hauling Swede turnips to cellar, 18 loads, 1170 bush.	100 00

*The "Daily Journal" referred to, is a standard annual publication and may be obtained from any first-class stationer.

make a memo. of it there. (See Daily Journal illustrated).

(B) If cash has been paid to you or by you, make entry in Cash Book. (See Cash Book illustrated).

(C) If anything has been bought or sold on account, that is, has not been settled for by cash or note, make an entry in the Ledger. (See Ledger illustrated).

After disposing of each item in this way, check it thus (✓), to indicate that no further attention is necessary. (See Daily Journal illustrated). Check Items.

SECTION II.

CASH BOOK.

In the Cash Book enter cash on hand at Cash Book. commencement, and all cash transactions as originally recorded in Daily Journal, in respective columns as received or paid. The difference between these columns showing the cash on hand.

The balance in bank may be kept on stub of cheque book, amount of each deposit being added to, and amount of each cheque taken from, the preceding balance. Balance in Bank.

To dispose of entries in Cash Book enter in Ledger, under proper headings, all transactions with individuals with whom a running account is kept, taking care to place all items of cash received, on right hand or credit side of Ledger, Dispose of Entries.

100	00
125	00
20	00
37	50

9

50	00
125	00
33	70
50	00
31	75

99

100	00
100	00

on and may be

and all items of cash paid, on left hand or debit side of Ledger. (See Ledger illustrated).

As in the Daily Journal, check each item in the Cash Book thus (✓) when disposed of.

CASH BOOK ILLUSTRATED.

DATE.		RECEIVED.	PAID.
1899.			
April 3	Cash on hand.	\$ 13 70	
" 17	H. Miller, paid on account, three cattle.	50 00	
June 30	Paid W. Smith on account binder.		\$ 25 00
✓ " "	Paid T. Moore balance in full of account to date.		33 70
" "	H. Miller paid note due to-day, account balance on cattle.	50 00	
✓ " "	James Hamilton paid account in full to date.	31 75	
Nov. 1	Drew cheque on Dominion Bank.	100 00	
" "	Paid note due to-day on account binder—by cheque.		100 00
" "	Balance on hand.		86 75
		<u>\$245 45</u>	<u>\$245 45</u>
Balance on hand \$86.75.			

SECTION III.

LEDGER.

Ledger.

Enter
Account
Transac-
tions.

In the Ledger, under respective headings, enter all transactions of sale or purchase "on account" as recorded in Daily Journal, also all cash transactions "on account" as already described under heading of "Cash Book," entering on the left hand or debit side all goods or cash given, and on the right hand or credit side all goods or cash received. (See Ledger illustrated). This system may be extended to cover such other accounts as the farmer may think

desirable, enabling him to ascertain how each department of his business is repaying him.

LEDGER ILLUSTRATED.

T. MOORE, GROCER.

1899.			1899.		
April 17	To 100 lbs. butter @ 20c.	\$20 00	April 3	By balance from old account.	\$11 80
May 10	To 5 doz. eggs @ 15c.	75	May 1	" Groceries.	17 40
"	To 40 lbs. butter @ 20c.	8 00	June 30	" "	33 25
June 30	To cash.	33 70			
		<u>\$62 45</u>			<u>\$62 45</u>

JAS. HAMILTON, FLOUR MERCHANT.

1899.			1899.		
Feb'y. 1	To balance from old account.	\$ 9 65	March 3	By flour.	\$15 40
April 17	To 50 bu. wheat @ 75c.	37 50	June 30	" cash.	31 75
		<u>\$47 15</u>			<u>\$47 15</u>

SECTION IV.

TO FIND PRESENT WORTH AND LOSS OR GAIN.

Once each year, say June first, take an inventory of all stock, implements, grain, produce, etc., on hand, at their present value. To this add cash in bank and on hand, and all accounts and notes owing you, making your total assets. From this take the total of accounts and notes you owe, and difference is your present worth.

Annual Statement.

By proceeding each year in a similar manner the farmer may ascertain his annual loss or gain.

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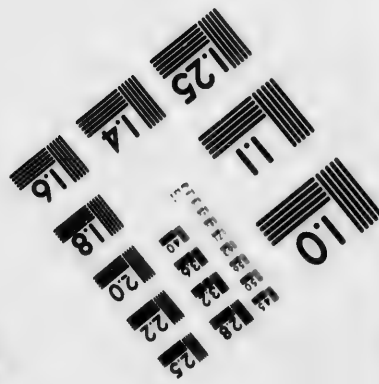
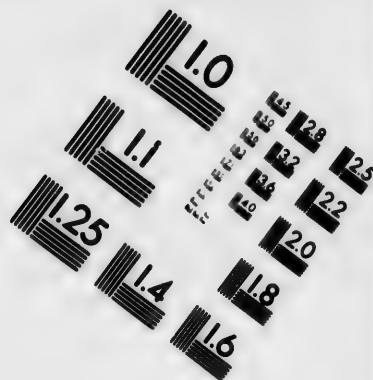
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